L 26658-66

ACC NR: AP6017115

for the detectors are mounted on the central part. Each of the two electromagnets has six sections with identical 20 deg. gaps. Each coil is water-cooled, has 900 turns of 1.2-mm dia. copper wire wound on a copper shell, and can carry up to 4 amp with negligible heating. Other details of the instrument, including the source, diaphragms, and detectors, are described. A section through the spectrometer in the plane of the pole plates is shown (see enclosure), as well as a photograph of the magnet section.

Experiments conducted with the instrument to calibrate it and test its capabilities and limitations are discussed extensively. Curves plotted from measurements of conversion lines are shown. The authors thank V. I. Leykum and G. Ya. Sozinov (Engineers of VNIIM) for building the instrument; V. Mikhaylov and V. Golubev (technicians of the "Etalon" Plant) for setting up the instruments; S. V. Semenov, A. A. Afonin, V. A. Koshelev and F.I. Chepikov for their help in calibrating the spectrometers. Orig. art. has: 7 figures and 1 table. [JPRS]

SUB CODE: 20 / SUBM DATE: none / ORIG REF: 004 / OTH REF: 004

Card 3/3 BLG

L 26656-66 EWT(m) DIAAP

ACC NR: AP6017117 SOURCE CODE: UR/0048/65/029/012/2205/2224

AUTHOR: Balalayev, V. A.; Dzhelepov, B. S.; Medvedev, A. I.; Uchevatkin, I. F.; Shestopalova, S. A.

ORG: All Union Scientific Research Institute of Metrology, im. D. I. Mendeleyev (Vsesoyuznyy nauchno-issledovatel'skiy institut metrologii)

TITLE: New data on Ce sup 135 decay /This paper was presented at the 15th Annual Conference on Nuclear Spectroscopy and the Structure of the Atomic Nucleus, held in Minsk from 25 January to 2 February 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 29, no. 12, 1965, 2205-2224

TOPIC TAGS: radioactive decay, cerium, electron spectrum, electron energy, radioisotope, gamma spectrum, electron transition

ABSTRACT: To verify the electron transitions of Ce^{135} having energies of 87 ± 1 and 120 ± 1 kev, a new study was made of the conversion electron spectra of the isotope in the electron energy range from 42 to 85. Earlier studies had included energies up to 2660 kev, but since the energy of Ce^{135} decay can reach 28000 kev, this study was extended from 2660 to 3090 kev. The results obtained are compared with those of K. Takahashi, et al., J. Phys. Soc. Japan, Vol. 19, No. 11, p 2014 (1964) in a table, and a systematic discrepancy is noted: the Japanese energy measurements are consistently lower (ranging from 0.3 to 2.7%) than those obtained in this paper.

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L 26656-66

ACC NR: AP6017117

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In the remainder of the paper the authors treat the relative intensities in the gamma-ray spectrum of Ce^{135}, determine the multipolarity of the transitions in La^{135}, plot curves for the photoelectron spectrum of Ce^{135}, tabulate transition intensities for the decay of Ce^{135}, tabulate transition intensities for the decay of $Ce^{135} \rightarrow La^{135}$, calculate 35 energy coincidences among the transitions between the excited states of La^{135}, discuss the decay scheme of Ce^{135}, and analyze the balance of intensities over the levels of La^{135}. The authors thank Ye. Ye. Bondar', A. Meshter, and L. I. Shalayev for assistance in making the measurements; K. Ya. Gromov and Zh. T. Zhelev for supplying the sources; N. A. Lebedev for the chromatographic separations of fractions; L. K. Pekar for useful discussions, and N. N. Kolesnikov for calculating the mass difference of the nuclei $Ce^{135} \rightarrow La^{135}$. Orig. art. has: 4 figures and 6 tables. [JPRS]

SUB CODE: 20 / SUBM DATE: none / ORIG REF: 014 / OTH REF: 002

Card 2/2

26654-66 EWT(1)/EWT(m) DIAAP/IJP(c) JD/JG/AT

ACC NR: AP6017120 SOURCE CODE: UR/0048/65/029/012/2250/2254

AUTHOR: Balalayev, V. A.; Dzhelepov, B. S.; Medvedev, A. I.; Meshter, A.

ORG: All-Union Scientific Research Institute of Metrology im. D. I. Mendeleyev (Vsesoyuznyy nauchno-issledovatel'skiy institut metrologii); Radium Institute im. V. G. Khlopin, AN SSSR (Radiyevyy institut AN SSSR)

TITLE: New data on the conversion electron spectra of La sup 140 [This paper was presented at the 15th Annual Conference on Nuclear Spectroscopy and the Structure of the Atomic Nucleus, held in Minsk from 25 January to 2 February 1965.]

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 29, no. 12, 1965, 2250-2254

TOPIC TAGS: electron spectrum, lanthanum, spectrometer, electron energy

ABSTRACT: The purpose of this paper is to refine the data on the conversion electrons of La^{140} at energies above 2.2 Mev. The authors use the 2 X 11 (2)² beta spectrometer of the All-Union Scientific Research Institute of Metrology. Conversion lines of transitions both above and below 2200 kev are plotted in curves and tabulated. No lines were observed in the range from 2530 to 2830 kev. The line K432 was found to differ from earlier results. No evidence of doublet structure of the line K1596, claimed by Nakvi and Hogg (Phys. Rev. vol. 128, p. 357 (1962)), was observed. The authors thank L. N. Moskvin for preparing the sources. Orig. art. has: 3 figures and 2 tables. [JPRS]

SUB CODE: 20 / SUBM DATE: none / ORIG REF: 008 / OTH REF: 002

Card 1/1

L 26652-66 EWT(1)/EWT(m) DIAAP/IJP(c) JD/JG/AT

ACC NR: AP6017121 SOURCE CODE: UR/0048/65/029/012/2264/2270

AUTHOR: Dzhelepov, B. S.; Moskvin, L. N.; Tishkin, P. A.; Uchevatkin, I. F.; Shishelov, I. A.

ORG: Scientific Research Physics Institute, Leningrad State University im. A. A. Zhdanov (Nauchno-issledovatel'skiy fizicheskiy institut Leningradskogo gosudarstvennogo universiteta); All-Union Scientific Research Institute of Metrology im. D. I. Mendeleyev (Vsesoyuznyy nauchno-issledovatel'skiy institut metrologii)

TITLE: Coincidence of conversion electrons in Ce sup 135 decay [This paper was presented at the 15th Annual Conference on Nuclear Spectroscopy and the Structure of the Atomic Nucleus, held in Minsk from 25 January to 2 February 1965.]

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 29, no. 12, 1965, 2264-2270

TOPIC TAGS: cerium, lanthanum, spectrometer, tantalum, proton, conversion electron spectrum

ABSTRACT: The reported work was carried out to verify the scheme of excited levels of La^{135}. The spectrum of the conversion electrons was obtained with the duplexed toroidal beta spectrometer of the Leningrad State University. The Ce^{135} sample was obtained from a tantalum target irradiated by 660 Mev protons for 5 to 10 hours. Results appear to be definitive for the locations of transitions with energies of 88.4 and 118.0 kev in the upper part of the decay scheme. The authors thank K. Ya. Gromov and Zh. T. Zhelev for supplying the preparations and N. A. Lebedev for the chromatographic separation of the fractions. Orig. art. has: 4 figures. [JPRS]

Card 1/1 SUB CODE: 20 / SUBM DATE: none / ORIG REF: 010 / OTH REF: 001

L 26783-66 EWT(m)

ACC NR: AP6017454 SOURCE CODE: UR/0166/65/000/006/0056/0063

AUTHOR: Abdumalikov, A. A.; Abdurazakov, A. A.; Gnatovich, V.; Gromov, K. Ya.; Dzhelepov, B. S.

ORG: Joint Institute of Nuclear Research (Ob"yedinnyy institut yadernykh issledovaniy); Tashkent Polytechnic Institute (Tashkentskiy politekhnicheskiy institut)

TITLE: Investigation of conversion electron spectra of the isotopes Tu sup 166, Yb sup 164, Tu sup 164, and Tu sup 162

SOURCE: AN UzSSR. Izvestiya. Seriya fiziko-matematicheskikh nauk, no. 6, 1965, 56-63

TOPIC TAGS: conversion electron spectrum, ytterbium, thulium, constant magnetic field, isotope, spectrographic analysis, tantalum, synchrocyclotron, gamma transition, radioactive decay, proton

ABSTRACT: The conversion electron spectra of thulium and ytterbium isotopes were investigated with a beta spectrograph and a constant magnetic field. The samples were obtained by irradiating a tantalum target for 1-2 hours with 660 Mev protons in the synchrocyclotron of the Joint Institute of Nuclear Research. Film exposure usually began about 3 hours after irradiation. The electron conversion lines for Tu^{166}, Yb^{164}, Tu^{164}, and Tu^{162} are reliably identified and the results tabulated. Accuracy of gamma-transition energy determinations was about 0.1%, and that of intensity determinations was about 20% for strong lines and about 40% for weak lines. Previously

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L 26783-66

ACC NR: AP6017454

unknown gamma transitions were found having the energies 112.8, 215.9, 228.1, 238.4, 293.2, 389.3, 496.8, 543.9 and 703.0 Kev. Results of the study are discussed in detail, analyzed and compared with other published data. The decay schemes of Tu^{166} and Yb^{164} are diagrammed. The following gamma-transitions, arising during decay of Yb^{164} between the odd-odd levels of the Tu^{164} nucleus, were discovered for the first time: 37.5 (MI), 149.3, 164.5 (MI), 187.7 (MI), 190.3, 324.2, 327.3, 362.9 and 390.4 Kev. The intensities of these lines are discussed in detail, and conclusions reached are compared with those of other authors. Orig. art. has: 2 figures and 4 tables. [JPRS]

SUB CODE: 20 / SUBM DATE: 31Jul64 / ORIG REF: 008 / OTH REF: 007

Card 2/2 CC

L 39635-66 EWT(m) SWP

ACC NR: AP6018850 SOURCE CODE: UR/0367/65/002/006/0966/0973

AUTHOR: Basina, A. S.; Bediko, T.; Gromov, K. Ya.; Dzhelepov, B. S.; Lobodev, N. A.; Morozov, V. A.; Novgorodov, A. F.

ORG: Joint Institute of Nuclear Studies (Ob"yedinennyy institut yadernykh issledovaniy); Loningrad State University (Loningradskiy gosudarstvennyy universitet)

TITLE: Decay of Pr sup 138 [19] /This paper was given at the 14th Annual Conference on Nuclear Spectroscopy, Tbilisi, February 1964./

SOURCE: Yadernaya fizika, v. 2, no. 6, 1965, 966-973

TOPIC TAGS: radioactive decay, praseodymium, gamma spectrum, conversion electron spectrum, cerium

ABSTRACT: The γ-spectrum, $\gamma\gamma$- and $\beta^+\gamma$ - coincidence spectra, and the conversion electron spectra of prascodymium samples obtained from Ta, To, and Er irradiated with 660 Mev protons were measured. The relative intensities of the γ- transitions with energies of 303, 789, and 1047 kev, observed in the γ-spectrum of Pr^{138}, were determined and tabulated. The $\gamma\gamma$-coincidence experiments give evidence of a cascade of transitions having the energies of 303-1047-789 kev. Measured $\beta^+\gamma$- coincidences did not confirm the existence of the β^+ decay of Pr^{138} to the 1840 kev level. The conversion electron transitions of 303 ± 1 and 789 ± 3 kev were investigated

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L 39835-66

ACC NR: AP6018850

on a lens-type beta spectrometer. The internal conversion coefficients $\alpha_{K303} = 0.14 \pm 0.02$ and $\alpha_{K789} = 3.42 \times 10^{-3}$ were determined. The first coefficient indicates that the 303 kev transition is type E3, while the second does not contradict the assumption that the 789 kev transition is purely E2. The quantum characteristics of the excited states of Ce^{138} are discussed. Orig. art. has: 3 figures and 4 tables. [Based on authors' Eng. abst.] [JPRS]

SUB CODE: 20 / SUBM DATE: 06Mar65 / ORIG REF: 004 / OTH REF: 005

Card 2/2 WLS

L 20962-66 EWT(m)/EWP(t)/ETI IJP(c) JD/JG

ACC NR: AP6019087 SOURCE CODE: UR/0367/66/003/001/0003/0007

AUTHOR: Voinova, N.A.; Dzhelepov, B.S.; Zhukovskiy, N.N.; Kalinichev, Yu.V.; Maloyan, A.G.; Sergeyev, A.O.

ORG: Physicotechnical Institute im. A.F. Ioffe, AN SSSR (Fiziko-tekhnicheskiy institut AN SSSR); Radium Institute, AN SSSR (Radiyevyy institut AN SSSR)

TITLE: Gamma radiation of Eu^{152} in the 1380-1900 keV energy range

SOURCE: Yadernaya fizika, v. 3, no. 1, 1966, 3-7

TOPIC TAGS: gamma radiation, europium, gamma spectrometer, radioisotope

ABSTRACT: The γ-spectrum of Eu^{152*} in the 1380-1900 keV energy range was investigated on the magnetic Compton γ-spectrometer elotron of the Physics-Engineering Institute of the USSR Academy of Sciences. New γ-lines with energies of 1510, 1577, 1680, and 1756 keV were found and their relative intensities determined. The energy of the 1411.9 $\pm$ 0.7 keV γ-line in Eu^{152*} was determined more precisely and this line was separated from the 1407.6 keV γ-line in Eu^{152}. The 1680 keV 1^+ level in Sm^{152} and the 1756 keV 1- level in Gd^{152} are studied. The decay scheme is discussed. Based on author's English abstract. Orig. art. has: 1 table and 3 figures. [JPRS]

SUB CODE: 18, 20 / SUBM DATE: 17Apr65 / ORIG REF: 002 / OTH REF: 005

Card 1/1 BLG

L 31298-66 EWT(m)

ACC NR: AP6022571 SOURCE CODE: UR/0048/66/030/003/0394/0402

AUTHOR: Dzhelepov, B. S.; Dmitriyev, A. G.; Zhukovskiy, N. N.; Malovan, A. G.

ORG: none

TITLE: Gamma radiation of Eu sup 156 in the 600 to 2400 kev range

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 3, 1966, 394-402

TOPIC TAGS: gamma radiation, gamma spectrum, europium, spectrometer, neutron irradiation, electron spectrum, radioactive decay scheme, gamma transition

ABSTRACT: In continuation of previous work the gamma spectrum of Eu^{156} was studied in the energy range of 600 to 2400 kev with a magnetic spectrometer. An enriched sample of Eu^{155} was irradiated with thermal neutrons (2×10^{14} cm^{-2}/sec) for 1000 hours, then aged 200 days. The Eu^{156} spectrum was obtained by subtracting the spectrum of $Eu^{152+154}$. The recoil electron spectrum is plotted for the entire range of energies and the most probable decay scheme is shown in a figure. Results of measured relative gamma-ray intensities are compared with those of other authors. Methods used are shown to be more accurate than those of other authors. Four new gamma transitions are introduced: hv = 907, 943, 1028, and 1686 kev. The schemes for these transitions are discussed.

The authors thank V. F. Rodionov and T. I. Sidorova for assistance in making the measurements. Orig. art. has: 2 figures and 2 tables. [JPRS]

SUB CODE: 18,20/SUBM DATE: none/ ORIG REF: 004/ OTH REF: 007

Card 1/1 CC

0915 0685

L 07155-67 EWT(m)/EWP(t)/ETI IJP(c) JD/JG
ACC NR: AP7001027 SOURCE CODE: UR/0048/66/030/001/0126/0131

AUTHOR: Balalayev, V. A.; Voinova, N. A.; Dzhelepov, B. S.; Moskvin, L. N. and Shestopalova, S. A.

ORG: All-Union Scientific Research Institute of Metrology im. D. I. Mendeleyev (Vsesoyuznyy nauchno-issledovatel'skiy institut metrologii); Physicotechnical Institute im. A. F. Ioffe AN SSSR (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Beta decay of ta sup 182 with energy above 600 kev (Paper presented at the 2nd All-Union Symposium on the Physics of thin Ferromagnetic Films; Irkutsk, 10-15 July 1964)

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 1, 1966, 126-131

TOPIC TAGS: radioactive decay, tantalum, beta radiation

ABSTRACT: In a previous paper the authors were the first to discover a continuous background in the 820-kev region for the beta decay of ta sup 182. This prompted a continuation of the work to investigate the hard beta radiation in the 1500-kev region of a stronger Ta sup 182 source. Results are pletted in curves, tabulated, and compared with results of other authors. The authors thank A. Meshter, If. F. Uchev and A. I. Medvedev for assistance in the taking of the measurements. I. F. Ucevatkin also took part in the operation and discussions of the original experimental data. The authors further thank G. M. Bukat for setting up the program for the electronic calculating machine. Orig. art. has: 3 figures and 2 tables.

Card 1/1 [illegible]

L 31408-66 EWT(m)

ACC NR: AP6022572 SOURCE CODE: UR/0048/66/030/003/0403/0406

AUTHOR: Dzhelepov, B. S.; Zhukovskiy, N. N.; Maloyan, A. G.; Prikhodtseva, V. P. 41 B

ORG: none

TITLE: Gamma spectrum of La^{140} in the energy range of 300 to 1610 kev

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 3, 1966, 403-406

TOPIC TAGS: gamma spectrum, lanthanum, lanthanum oxide, neutron irradiation, thermal neutron, spectral line, radioactive decay, gamma transition

ABSTRACT: New studies were carried out on the gamma spectrum of La^{140} with an elotron having a resolution of $\Delta H\rho/H\rho = 1.2\%$ (at 1 Mev) in the range of 300 to 1610 kev. The gamma ray source was a lanthanum oxide target irradiated with thermal neutrons. Curves plotted of the overall spectrum and of the region of interest are shown. New weak transitions are clearly observed at 434 and 726 kev. The 635 kev line observed by other authors was not seen and is assumed to have an intensity of less than 1.0% per decay. Detailed studies are not made in the range of 970 to 1500 kev, so the new weak transitions previously reported in the literature at 1088, 1120, 1415, and 1680 kev are not confirmed but are assumed to have an intensity of less than 0.3% per decay.

Data obtained for the various transitions are tabulated and compared with the results of other authors. The conversion line at 1595.5 ± 1.5 kev is found to be singlet rather than a doublet as previously supposed. The authors thank E. P. Grigor'yev and M. P. Avotina for allowing them to use the ПУ2 spectrometer, L. N. Moskvin for preparing the sources, and T. I. Sidorova for help in measuring the electron. Orig. art. has: 4 figures and 1 table. [JPRS]

SUB CODE: 20/ SUBM DATE: none/ ORIG REF: 005/ OTH REF: 004

Card 1/1 CC

L 31407-66 EWT(m)

ACC NR: AP6022573 SOURCE CODE: UR/0048/66/030/003/0413/0415

AUTHOR: Balalayev, V. A.; Dzhelepov, B. S.; Medvedev, A. I.; Uchevatkin, I. F.; Shestopalova, S. A.

ORG: All-Union Scientific Research Institute of Metrology im. D. I. Mendeleyev (Vsesoyuznyy nauchno-issledovatel'skiy institut metrologii)

TITLE: New data on the spectrum of conversion electrons for the strongest transitions in Yb sup 170

SOURCE: AN SSSR. Izvestiya fizicheskaya, v. 30, no. 3, 1966, 413-415

TOPIC TAGS: ytterbium, transition radiation, conversion electron spectrum, spectral line, electron energy level

ABSTRACT: The availability of a new higher-energy source made it possible to study conversion electrons having energies above 3150 kev. The reference used was the K-conversion line of the transition 2955.2 kev. The spectrum from 2880 to 3150 kev was remeasured to confirm those made above 3150, inasmuch as the spectrum is complex and the K, L, and M lines of the various transitions overlap. Results of measurements above 3150 kev, given in a table, are essentially new. Six new transitions were found: 3224, 3245, 3263, 3287, 3302 and 3325. The latter is suggested as possibly the strongest transition in the spectrum. The authors thank K. Ya. Gromov and Zh. T. Zheleva for providing the sources. Orig. art. has: 1 figure and 1 table. [JPRS]

SUB CODE: 20/ SUBM DATE: none/ ORIG REF: 003

Card 1/1

L 31405-66 EWT(m)

ACC NR: AP6022575 SOURCE CODE: UR/0048/66/0030/003/0527/0529

AUTHOR: Dzholepov, B. S.; Tishkin, P. A.; Shishelov, I. A.

ORG: Scientific Research Physics Institute, Leningrad State University (Nauchno-issledovatel'skiy fizicheskiy institut Leningradskogo universiteta)

TITLE: Excitation of a state with energies of 336 kev in the decay of Yb sup 169 yields Tu sup 169

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 3, 1966, 527-529

TOPIC TAGS: excited state, radioactive decay, chromatography, particle accelerator target, proton accelerator, synchrocyclotron, radiation spectrometer, conversion electron spectrum, beta spectroscopy

ABSTRACT: The decay of $Yb^{169} \rightarrow Tu^{169}$ is studied for the purpose of discovering the ~336 kev energy state by the "electron-electron" coincidence method. The Yb^{169} sample was extracted by chromatography from the lithium fraction of a tantalum target irradiated by 660 mev protons for 5 hours in the Dubna synchrocyclotron. Measurements were made on a double toroidal beta spectrometer. A graph is shown of a portion of the coincidence spectrum of the K131 Tu^{169} conversion electrons. The intense coincidence peaks observed are identified as K. L. and M conversion lines of the 177 kev transition and (M+N) 131 and K198 spectrum of the conversion electrons. The relative intensities of the 177 kev K and L

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L 31405-66
ACC NR: AP6022575

conversion electrons are not in agreement with the results of other authors. The K lines of the 131 and 198 kev transitions are discussed, and possible explanations are given. Results are compared with those of other investigators. The authors thank G. S. Novikov for preparing the radioactive sources and V. M. Mikhaylov for useful discussions. Orig. art. has: 1 figure and 1 table. /JPRS/

SUB CODE: 20, 18/SUBM DATE: none/ ORIG REF: 004/ OTH REF: 008

Card 2/2

L 31404-66 EWT(m)
ACC NR: AP6022576 SOURCE CODE: UR/0048/66/030/003/0530/0553

AUTHOR: Avotina, M. P.; Grigoryev, Ye. P.; Dzhelepov, B. S.; Zolotavin, A. V.; Sergeyev, V. O.

ORG: Scientific Research Physics Institute, Leningrad State University (Nauchno-issledovatel'skiy fizicheskiy institut Leningradskogo gosudarstvennogo universiteta)

TITLE: Decay of Ho sup 160 [12] This paper was presented at the 16th Annual Conference on Nuclear Spectroscopy and Nuclear Structure held in Moscow 26 Jan-3 Feb 1966]

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 3, 1966, 530-553

TOPIC TAGS: spectrometer, radioactive decay, nuclear physics conference, conversion electron spectrum, beta spectroscopy, particle accelerator target, synchrocyclotron, rare earth element, chromatography,

ABSTRACT: This is partly a review and partly an experimental paper reporting a continuation of work on the decay of Er^{160} + Ho^{160*} + Ho^{160} under improved conditions for studying the conversion electron spectrum. The study was carried out with two modernized, high-resolution, double focussing beta spectrometers: one with an equilibrium orbit of 140 mm; and the other, 500 mm. The Ho^{160*} and Ho^{160} samples were obtained from the isotope Er^{160}. A tantalum target was irradiated by 660 mev protons for 1.5 to 8 hrs. in a synchrocyclotron, and the rare earth group was separated chemically and then fractioned in a chromatographic column.

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L 31404-66

ACC NR: AP6022576

Extensive information was gathered on the conversion electron spectrum of Er^{160} + Ho^{160} and is presented in a 3-page table which shows transition energies, conversion lines, I_e, multipolarity of the gamma transition, conversion coefficient, gamma ray intensity, total intensity of the transition, and position of the transition in the decay scheme. Detailed data is also given on many Dy^{160} levels and transitions, and three rotational bands are established. Experimental results are compared with theory and the results of other authors. The multipolarity and intensity of the isomeric transition of Ho^{160} is discussed, as well as the quantum characteristics of its levels, positron decay, and electron capture. The authors thank K. Ya. Gromov and Zh. T. Zhelev for thier interest and assistance, L. K. Peker and V. G. Solov'ev for discussing the results, N. A. Lebedev for the chemical isolation of Er sup 160, and G. A. Mironov and M. I. Covtsov for help with the measurements. Orig. art. has: 8 figures and 10 tables. /JPRS/

SUB CODE: 20, 18/ SUBM DATE: none/ ORIG REF: 018/ OTH REF: 012

Card 2/2 CC

L 31403-66 EWT(m)/T

ACC NR: AP6022577 SOURCE CODE: UR/0048/66/030/003/0554/0559

AUTHOR: Dzhelepov, B. S.; Zaytseva, N. G.; Kraft, O. Ye.; Naumov, Yu. V.; Sigalov, V. M. 48 B

ORG: none 19

TITLE: Spin of sub 71 Lu sup 170 sub 99 [This paper was presented at the 16th Annual Conference on Nuclear Spectroscopy and Nuclear Structure held in Moscow 26 Jan-3 Feb 1966]

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 3, 1966, 554-559

TOPIC TAGS: nuclear physics conference, nuclear spin, lutetium, beta decay, proton bombardment

ABSTRACT: The beta$^+$ gamma coincidence method is used to determine the spin of Lu^{170} which has a beta$^+$ decay to the lower rotational band of Yb^{170}. The Lu^{170} sample was obtained from Hf^{170}, with the usual bombardment of a tantalum target with 660 mev protons. The coincidences of ~1660 kev positrons and gamma radiation was studied in the range of 10 to ~250 kev. Coincidences were not observed at energies of 193 and 84 kev, nor were beta$^+$ transitions from the Lu^{170} ground state to the 2^+ and 4^+ levels of Yb^{170}. It is shown that the ground state spin of Lu^{170} is zero - a conclusion that is supported by theoretical arguments. Finally, the purity of the isotopic spin in the ground state of Lu^{170} is determined. The coefficient of impurity isospin (5×10^{-3}) determined theoretically is 20 times greater than the experimental value, which fact needs theoretical explanation. The authors thank L. A. Sliv, and Yu. I. Kharitonov for valuable discussions. Orig. art. has: 2 figures and 7 formulas. [JPRS]

Card 1/1 SUB CODE: 20/SUBM DATE: none/ ORIG REF: 009/ OTH REF: 008

L 44429-66 EWT(m)/EWP(t)/ETI IJP(c) JD
ACC NR: AP6023077 (AN) SOURCE CODE: UR/0367/66/003/004/0593/0597

AUTHOR: Voinova, N. A.; Dzhelepov, B. S.; Kalinichev, Yu. V.; Kaminker, D. M.; Sergeyev, A. G.

ORG: Physicotechnical Institute im. A. F. Ioffe, Academy of Sciences SSSR (Fiziko-tekhnicheskiy institut Akademii nauk SSSR)

TITLE: Gamma spectrum of Mn^{56} isotopes

SOURCE: Yadernaya fizika, v. 3, no. 4, 1966, 593-597

TOPIC TAGS: gamma spectrum, electron paramagnetic spectrometer, nuclear energy, radioactive decay, manganese isotope

ABSTRACT: The γ-spectrum of Mn^{56} has been measured by a magnetic spectrometer of the "electron" type. The γ-transition energy is obtained with 0.03 to 0.04% accuracy. Since the pattern of the Mn^{56} decay is well-known, the measurement of the Mn^{56} spectrum improved the energy calibration of the spectrometer in the energy region higher than 1.4 Mev, and gave the best values for the energy of Fe^{56} levels, exited in the Mn^{56} decay. Intensities of the Mn^{56} γ-transitions

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L 44429-66

ACC NR: AP6023077

have been determined. The authors thank A. I. Yegorov for preparing an oxide manganese compound and V. A. Vesna for assistance in calculations. Orig. art. has: 5 figures and 3 tables. [Based on authors' abstract] [NT]

SUB CODE: 18/ SUBM DATE: 06Mar65/ ORIG REF: 002/ OTH REF: 009

Card 2/2

L 44037-66 EWT(m)/EWP(t)/ETI IJP(c) JD/HW

ACC NR: AP6032229 SOURCE CODE: UR/0367/66/003/005/0785/0793

AUTHOR: Dzhelepov, B. S.; Zhukovskiy, N. N.; Maloyan, A. G. 38 B

ORG: none

TITLE: Gamma-radiation of 12.3-year Eu sup 152 27

SOURCE: Yadernaya fizika, v. 3, no. 5, 1966, 785-793

TOPIC TAGS: gamma spectrum, radioactive decay, europium

ABSTRACT: The γ-spectrum of 12.3-year Eu^{152} is investigated with the help of photoritron and elotron magnetic spectrometers. 29 γ-lines were observed and their energy and relative intensities were measured with an accuracy higher than in previous papers. The 296, 360, 674, 720, 840, 1253, and 1454 keV lines were found for the first time. The α_K-values for 15 γ-transitions were determined more precisely. The decay scheme of Eu^{152} is given: the γ-transition intensities and lg ft values are obtained from the results of the present investigation. The authors thank Yu. V. Khol'nov for making possible the research on the γ-spectrum Eu^{152} on the photoritron magnetic spectrometer. Further thanks go to A. G. Dmitriyev, E. A. Arutyunyan and T. I. Sidorovaya for assistance with the measurements and processing of the experimental data. Orig. art. has: 4 figures, 3 formulas and 3 tables. [Based on authors' Eng. abst.] [JPRS: 36,712]

SUB CODE: 20, 18 / SUBM DATE: 13May65 / ORIG REF: 008 / OTH REF: 008

Card 1/1 blg

0919 1254

L 09229-67 EWT(m)/EWP(t)/ETI IJP(c) JD/JG

ACC NR: AM7002792 SOURCE CODE: UR/0048/66/030/008/1253/1259

AUTHOR: Arutyunyan, E. A.; Vrzal, Ya.; Dzhelepov, B. S.; Liptak, Ya.; Urbanets, Ya.; Mol'nov, Yu. V.

76
74

ORG: none

TITLE: Gamma ray spectrum of Ce sup 143

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 8, 1966, 1253-1259

TOPIC TAGS: gamma radiation, gamma spectrum, radiactive decay, radioisotope, cesium

21

ABSTRACT: The -radiation of Ce^{143} was investigated with the aid of a Ge(Li)-spectrometer. Detector characteristics: depth of sensitive layer 6 mm; working volume, 5 cm^3; half-width of the -lines of Co^{60}, 4 kev. The source was prepared by the (n) reaction of a specimen of Ce^{142} enriched to 89.7%. The -spectrum was measured over the energy range of up to 2000 kev with the aid of 512- and 2048-channel pulse analyzers, the average exposure time being three hours. The values obtained for the energies and relative intensities of the -rays of Ce^{143} are tabulated. Twenty-six -lines were obtained. The finds are generally in agreement with the findings of other investigators. Major difference in intensities are observed for the transitions with energies of 372, 587, 795, (triple line), and 936 kev, however. The transitions E = 392, 500, 556, 804, 1000, 1029, 1044, 1058, 1325 kev do not fit in the scheme of Pr^{143} proposed by Gopinathan et al. (Phys.

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09225 1671

L 09229-67
ACC NR: AP7002792

2

Rev., 136, 1247 (1964)) (measurements with scintillation spectrometers). The scheme of the decay of Co^{143} will be discussed later. "The authors are indebted to L. N. Moskvin for chemical purification of the preparation and to T. I. Sidorova for assistance in analyzing the findings." Orig. art. has: 4 figures and 1 table. [JPRS: 39,040]

SUB CODE: 20,18 / SUBM DATE: none / ORIG REF: 002 / OTH REF: 002

Card 1/1

L 08236-67 EWT(m)/EWA(t)/ETI IJP(c) JD/JG
ACC NR: AT6032793 SOURCE CODE: UR/0048/66/030/008/1260/1264

AUTHOR: Amatyunyan, E. A.; Vrzal, Ya.; Dzhelepov, B. S.; Liptak, Ya.; Urbanets, Ya.; Kholnov, Yu. V.

ORG: none

TITLE: Gamma ray spectrum of ND sup 147

SOURCE: AN SSSR. Izvestiya, Seriya fizicheskaya, v. 30, no. 8, 1966, 1260-1264

TOPIC TAGS: gamma spectrum, pulse analyzer, gamma spectrometer

ABSTRACT: The γ-ray spectrum of Nd^{147} was investigated with the aid of a Ge(Li)-detector built in the Prague Institute of Solid-State Physics. The spectrum was recorded by means of 2048- and 512-channel pulse analyzers. The Nd^{147} source was obtained from enriched Nd^{146} with the aid of the reaction $Nd^{146}(n\gamma)Nd^{147}$. Four series of measurements with an average exposure time of 3 hr were carried out. Findings: The intensities of all γ-lines decrease in time with a period equal to the half-life of Nd^{147}. The recorded intensities and energies of the γ-rays of Nd^{147} were tabulated and compared with the E_γ and I_γ obtained by means of a magnetic γ-spectrometer, a scintillation spectrometer, and a β-spectrometer of the $\pi\sqrt{2}$ type. Peaks corresponding to the γ-transitions at 542, 590, 610, 622 kev could be plotted for the first time. The presence of 310-kev γ-rays corresponding to the transition 720 → 410 kev, which was observed by Gunye et al. (Saraf. Phys. Rev., 124,

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172 (1961)), could not be confirmed (the intensity of the corresponding quanta was below 0.2 of the intensity of the transition $E\gamma$ = 531 kev). "The authors are indebted to L. N. Moskvin for chemical purification of the preparation /Nd^{147} source/ and to T. I. Sidorova for assistance in analyzing the findings." Orig. art. has: 3 figures and 1 table. /JPRS: 39,040/

SUB CODE: 20 / SUBM DATE: none / ORIG REF: 001 / OTH REF: 002

L 00236-67 EWT(m)/EWA(d)/EWP IJP(c) JD/JG

ACC NR: AT7002794 SOURCE CODE: UR/0048/66/030/003/1265/1276

AUTHOR: Bilenkiy, B. S.; Dmitriyev, A. G.; Zhukovskiy, N. N.; Maloyan, A. G. 27

ORG: none

TITLE: Gamma spectrum of Eu sup 154

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 8, 1966, 1265-1276

TOPIC TAGS: gamma radiation, gamma transition, gamma spectrum

ABSTRACT: γ-radiation of Eu^{154} was investigated with the aid of a magnetic spectrometer. All the isolated γ-lines of Eu^{154} and their relative intensities were tabulated. Altogether, 32 γ-lines were detected in the region $h\nu > 200$ kev, of which only 14 lines had been previously known. The conversion coefficients for transitions to Gd^{154} can be determined by utilizing the data on the relative intensities of the K-conversion and γ-lines accompanying the decay of Eu^{154} on condition that the conversion coefficient of at least one transition is known. The scheme of Gd^{154} levels is complemented with two new levels with the energies 1617 and 1663 kev. The first level is deexcited by three transitions $h\nu$ = 1493, 1248, and 616 kev to the levels 2^+, 2^+, and 4^+ with the energies 123, 371, and 998 kev respectively. The level with 1663-kev energy makes it possible to place the observed -transitions having energies of 1539, 847, and 616 kev: they are arrayed between this level and the levels 2^+, 2^+, and 4^+ with the energies of 123, 816, and 1049 kev

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L 09235-67

ACC NR: AP7002794

respectively. The balance of intensities of γ-transitions with respect to Gd^{154} levels was utilized to determine the percentile ratio of the β-components of Eu^{154} and to calculate the values of log ft, which were found to be anomalously high. Orig. art. has: 7 figures 2 formulas and 3 tables. [JPRS: 39,040]

SUB CODE: 20 / SUBM DATE: none / ORIG REF: 004 / OTH REF: 014

ACC NR: AP6028796 SOURCE CODE: UR/0048/66/030/008/1314/1321

AUTHOR: Balalayev, V. A.; Dzhelepov, B. S.; Medvedev, A. I.; Uchevatkin, I. F.; Shestopalova, S. A.

ORG: All-Union Scientific Research Institute of Metrology im. D. I. Mendeleyev (Vsesoyuznyy nauchno-issledovatel'skiy institut metrologii)

TITLE: Multipole order of the transition with 1095-kev energy in Yb^{172}

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 8, 1966, 1314-1321

TOPIC TAGS: radioactive decay, lutetium

ABSTRACT: In recent years this matter has been the subject of sharp discussion. Stautberg et al. (Phys. Rev., 130, 1901 (1963)) claim that the multipole order of the transition with 1095-kev energy in Yb^{172} is M1 + 5% E2, whereas Guenthor et al. (Nucl. Phys., 61, 65 (1965)) conclude that it is M1 + 5%-13 + 0.2% E2); both these findings diametrically contradict the authors' earlier findings (Dzhelepov et al. Izv. AN SSSR, Ser. Fiz., 28, 64 (1964)) that the multipole order of this transition is either E + 2 (5-5+7)% M1 or E1 + (15+ 1)% M2. To clarify this matter a new method of investigation was adopted: a Lu^{171} + Lu^{172} preparation was employed, since one of the transitions occurring in Yb^{171} during the decay of Lu^{171} has a known multipole order (with reference to the 740-kev transition). The results obtained were found to be in virtual agreement with the earlier findi-

of the authors:

d 1/2

L 09234-67 EWT(m)/EWP(t)/ETI IJP(c) JD/JG

ACC NR: AP7002795 SOURCE CODE: UR/0048/66/030/008/1286/1291

32

AUTHOR: Dzhelepov, B. S.; Kraft, O. Ye.; Naumov, Yu. V.

ORG: none

TITLE: Beta + gamma coincidences during the decay of Tb sup 152 yields Gd sup 152

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 8, 1966, 1286-1291

TOPIC TAGS: gamma spectrometer, gamma radiation, position

ABSTRACT: These coincidences were measured with the object of procuring more information on the spin of the Tb^{152} nucleus, which has not previously been experimentally determined. A magnetic $\beta\gamma$-coincidence spectrometer was used: the magnetic spectrometer isolated positrons within a specified energy range and the γ-spectrometer recorded the γ-radiation coinciding with these positrons. The measurements pertained to the spectrum of γ-rays coinciding with positrons of the following energies: ~2500, ~2000, ~1500, and ~1200 kev. Findings: With decrease in positron energies, coincidences with γ272 quanta are observed. The fundamental state of Tb^{152} cannot have the characteristic $I^{\pi} \geq 3^{+}$. The most probable values of the spin and parity of the fundamental state of Tb^{152} must be regarded as 1^{-}. "In conclusion, the authors wish to express their deep appreciation to L. V. Moskvin and Yu. V. Norseyev for isolating terbium from dysprosium, and they thank Zh. T. Zhelev and K. Ya. Gromov for cooperation in procuring the sources." Orig. art. has: 4 figures and 1 table. [JPRS: 39,040]

Card 1/1 SUB CODE: 20 / SUBM DATE: none / ORIG REF: 010 / OTH REF: 004

0925 1682

L 09232-67 EWT(m)/EWP(t)/ETI IJP(c) JD
ACC NR: AP7002797 SOURCE CODE: UR/0048/66/030/008/1322/1324

AUTHOR: Dzhelepov, B. S.; Ivanov, R. B.; Moskvin, L. N.; Rodionov, V. F. 24

ORG: none

TITLE: Investigation of the gamma spectrum of Ac^{225} 21

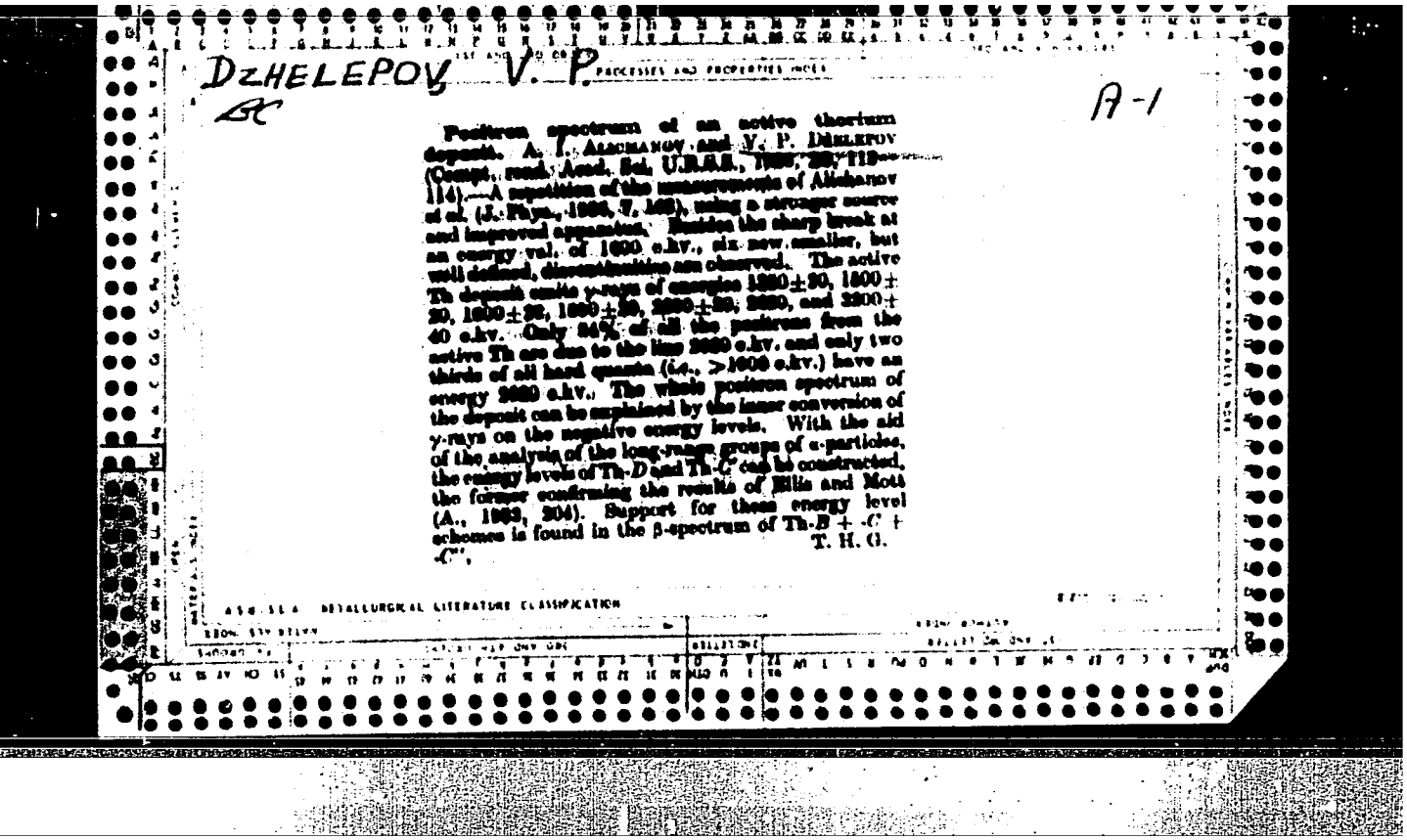
SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 8, 1966, 1322-1324

TOPIC TAGS: synchrocyclotron, alpha spectrum

ABSTRACT: Revised values of the energies and intensities of the α-transitions of Ac^{225} are presented. The source itself was obtained by bombarding a thorium target with protons of 660-Mev energy in a synchrocyclotron. The α-spectrum was investigated by means of a magnetic -αspectrometer. Findings: in addition to the already known α-groups, a number of new low-intensity transitions was detected and tabulated. To verify that they belong in the Ac^{225} group, the spectral regions in which they are present were subjected to another exposure in order to determine the corresponding half-life periods. In general, these findings are in satisfactory agreement with the data of Kalevi valli (Ann. Acad. Sci. Fenn., ser. A. VI, Physica, 165 (1964)). In conclusion, the authors wish to express their appreciation to E. V. Leykina for assistance in measurements and M. A. Mikhaylov for participation in the analysis of the findings. Orig. art. has: 1 figure and 1 table. [JPRS: 39,040]

SUB CODE: 20 / SUBM DATE: none / ORIG REF: 004 / OTH REF: 003

Card 1/1 mla 0925 1685



DZHELEPOV, V. P.

A-1

Positron spectrum of an active thorium deposit. A. T. Alichanov and V. P. Dzhelepov (Compt. rend. Acad. Sci. U.R.S.S., 1938, 20, 113–114).—A repetition of the measurements of Alichanov et al. (J. Phys., 1936, 7, 145), using a stronger source and improved apparatus. Besides the sharp break at an energy val. of 1600 e.kv., six new, smaller, but well defined, discontinuities are observed. The active Th deposit emits γ-rays of energies 1220±20, 1500±20, 1600±20, 1650±20, 2220±20, 2620, and 2920±40 e.kv. Only 24% of all the positrons from the active Th are due to the line 2620 e.kv. and only two thirds of all hard quanta (i.e., >1600 e.kv.) have an energy 2620 e.kv. The whole positron spectrum of the deposit can be explained by the inner conversion of γ-rays on the negative energy levels. With the aid of the analysis of the long-range groups of α-particles, the energy levels of Th-*D* and Th-*C* can be constructed, the former confirming the results of Ellis and Mott (A., 1932, 304). Support for these energy level schemes is found in the β-spectrum of Th-*B* + -*C* + -*C*". T. H. G.

DZHELEPOV, V. P.

USSR/ Physics - Nuclear physics

Card 1/1 Pub. 22 - 15/63

Authors : Dzhelepov, V.P., and Kazarinov, Ya. M.

Title : Elastic dispersion of 380 mev neutrons by protons

Periodical : Dok. AN SSSR 99/6, 939-942, Dec 21, 1954

Abstract : Experiments with the dispersion of 380 mev neutrons by 480 mev protons, obtained at the synchrocyclotron of the Institute of Nuclear Forces of the Acad. of Scs. of the USSR, are described. Cross-sections of the (n-p) and (p-p) reactions also "total" (nuclear) cross-sections were determined theoretically and experimentally. Seven USSR references (1951-1954). Graphs; diagram.

Institution: The Institute of Nuclear Problems of the Acad. of Scs. of the USSR

Presented by: Academician L.A. Artsymovich, November 4, 1954

DZHELEPOV, V.P.

USSR/ Physics - Nuclear physics

Card 1/1 Pub. 22 - 16/63

Authors : Dzhelepov, V.P.; Golovin, B.M.; and Salarov, V.I.

Title : Elastic dispersion of neutrons by neutrons at the energy of 300 mev

Periodical : Dok. AN SSSR 99/6, 943-946, Dec 21, 1954

Abstract : Experiments with the dispersion of neutrons by neutrons of 300 mev energy are described. Due to the small effectiveness of neutron beams, generated by an accelerator and the difficulties in detecting fast neutrons, a special method of conducting the experiments was worked out. The special method is described together with the equipment used. The method enables one determine the cross-section of the σ_{nn} dispersion reaction and the total nuclear cross-section. σ_t $(n\text{-}n)$. Eleven references; 8-USSR (1950-1954). Diagram; table.

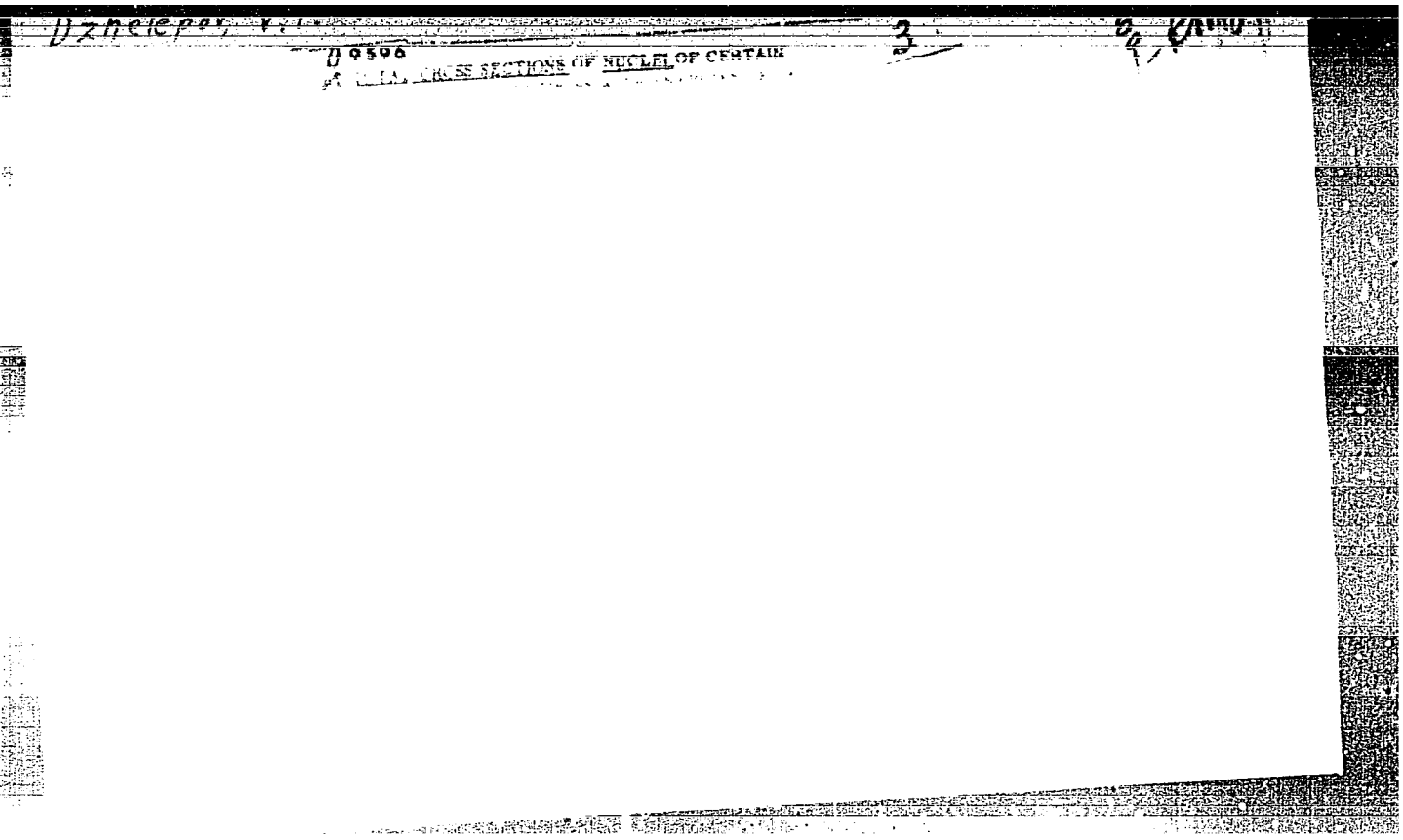
Institution: .....

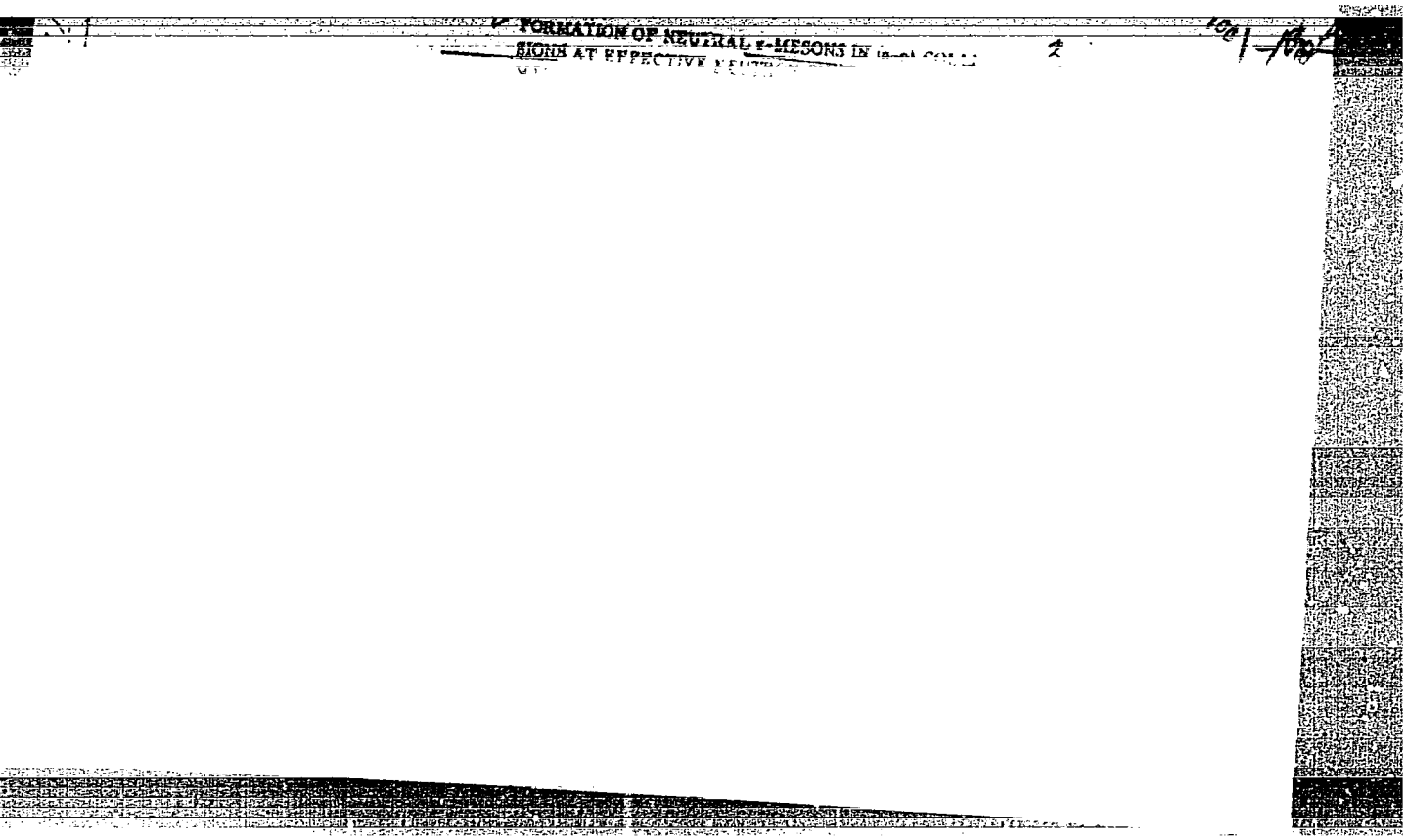
Presented by: .....

DZHELEPOV, V.P.; KAZARINOV, Yu.M.; GOLOVIN, B.M.; FLYAGIN, B.V.

Experimental investigation of neutron-nucleon and neutron-deuteron interactions in the 380--590 Mev energy range. Izv.AN SSSR Ser.fiz. 19 no.5:573-588 S-O '55. (MLRA 9:4)

1.Institut yadernykh problem Akademii nauk SSSR.
(Cosmic rays) (Nuclear physics)





DZHELEPOV, V. P.

USSR/Physics - Neutrons

Card 1/2 : Pub. 22 - 12/60

Authors : Dzhelepov, V. P.; Kazarinov, Yu. M.; and Flyegin, V. B.

Title : Exchangeable dispersion of neutrons of 380 Mev energy over deutrons and the spinning relationship of exchanging forces

Periodical : Dok. AN SSSR 100/4, 655-658, Feb 1, 1955

Abstract : Experiments with (n-p) and (n-d) - dispersing systems are described. The experiments were intended to establish the relationship between the number of protons recoiling under a certain angle, mainly under angle $\theta = 0^\circ$, and the number of neutrons in a beam of a diffuser (plane or heavy water with an equal number of hydrogen or deutercum particles). Otherwise the ratio $N_i^c(\theta)/N_i^f(\theta)$, was sought where $N_i^f(\theta)$ is

Institution : Acad. of Sci., USSR, Institute of Nuclear Problems

Presented by : Academician L. A. Artsymovich, December 9, 1954

Periodical : Dok. AN SSSR 100/4, 655-658, Feb 1, 1955

Card 2/2 : Pub. 22 - 12/60

Abstract : proportional to the difference of exchangeable cross-sections of the (n-p) and (n-d)-collisions, and for the given angle is determined as follows: $N_i^r(\theta) = K[\sigma_{np}(\theta) - \sigma_{nd}^{obm}(\theta)]$.
Seven references: 5 USSR and 2 USA (1951-1954). Graphs.

DZHELEPOV, V. P.

1539

ENERGY DEPENDENCY OF TOTAL NUCLEAR CROSS SECTIONS IN THE NEUTRON ENERGY RANGE FROM 360 TO 630 MEV. V. P. Dzhelepov, V. I. Satarov, and B. M. Golovin. (Inst. of Nuclear Problems.) Doklady Akad. Nauk S.S.S.R. 104, 717-20(1955) Oct. 11. (In Russian)

62

The total cross sections of neutron interaction with various nuclei in the energy range from 360 to 630 Mev are given. With the change of the energies from 360 to 630 Mev the cross sections of light nuclei (Be, C, O, Al) increase from 15 to 20%, while the cross section of heavy element nuclei (PbU) remain relatively unchanged. The scheme of the experiment and tabulations are presented. (R.V.J.)

(2)

DZHELEPOV, V.P.

DZHELEPOV, V.P., GOLOVIN, B.M., KAZARINOV, UM, and SIMONOV, UN.

Elastic scattering of 580 MeV neutrons by protons and neutrons (II/48)

CERN-Symposium on High Energy Accelerators and Pion Physics.

Geneva, 11-23 June 56
In. Branch #5.

DZHELEPOV, V.P.

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1480
AUTHOR EFREMOV,D.V., MEŠČERJAKOV,M.G., MINC,A.L., DŽELEPOV,V.P.,IVANOV,P.P., KATYŠEV,V.S., KOMAR,E.G., MALYŠEV,I.F., MONOSZON,N.A., NEVAŽSKIJ,I.CH., POLJAKOV,B.I., ČESTNOJ,A.V.
TITLE The 6m-Synchrocyclotron of the Institute for Nuclear Problems in the USSR.
PERIODICAL Atomnaja Energija, 1, fasc.4, 5-12 (1956)
Issued: 10 / 1956 reviewed: 11 / 1956

The 5m-synchrocyclotron, which was built in 1949, was rebuilt in 1953 by the addition of a new vacuum chamber with a diameter of 6 m of the poles of the electromagnet. The energy of the accelerated protons was thereby increased to 680 MeV and the average amperage in the exterior orbits now amounts to 0,3 microampères. Also a new high frequency resonance system was built. The synchrocyclotron, after being reconstructed in the manner described, now furnishes intense bundles of positive and negative pions (up to 400 MeV) and of neutrons up to 600 MeV. By a minor modification of certain elements of the resonance system it is possible to obtain also deuterons of up to 420 MeV and α-particles of up to 840 MeV.
The individual parts (electromagnet, resonance system high frequency generator, vacuum system, ion source, emission of particles), the arrangement of these parts, and control of the synchrocyclotron are described in detail.
The main items of nuclear research carried out by means of this instrument are:
The elastic scattering of protons by protons, of neutrons by protons, and of

neutrons by neutrons; the production of charged and neutral pions on the occasion of collisions between nucleons and nucleons; the interaction of pions with nucleons. Furthermore, the interaction of nucleons and pions with atomic nuclei is studied.

Summary: This accelerator is at present the largest of its type throughout the world. It is used systematically by ten physical and chemical institutes of the Academy of Science in the USSR for purposes of nuclear research. The accelerator works regularly for 100 to 105 hours a week. It is possible to work out investigations of 13 bundles of protons, neutrons and pions of high energy.
The accelerator is the product of the work performed in the course of several years by numerous scientists, engineers, and constructors. It was built by the cooperation of many, particularly electrotechnical factories. In connection with the development of various of its parts a considerable amount of physical, electrotechnical, radiotechnical, electronic, and vacuumtechnical research work was performed. Many difficulties could be foreseen, others were overcome in the course of initial work. The upper energy limit for this method of acceleration is apparently near ~ 1000 MeV.

INSTITUTION:

Dzhelepov, V. P.

Complete nuclear cross sections of some elements for neutrons with energies up to 500 m.e.v. V. P. Dzhelepov, V. I. Satarov, and B. M. Golovin. *Soviet Phys. JETP* 3, 349-51 (1950) (Engl. translation).—See *C.A.* 50, 2308h.
B. M. R.

3

Dzhelepov, V.P.

INSTRUMENTATION: CLOUD CHAMBERS

"Setup with Cloud Chamber in a Pulsed Magnetic Field Used for Nuclear Research With a Synchrocyclotron", by V.P. Dzhelepov, M.S. Kozodayev, V.T. Osipenkov, N.I. Petrov, and V.A. Rusakov, Joint Institute for Nuclear Research, Pribory i Tekhnika Eksperimenta, No 3, November-December 1956, pp 3-9.

The authors describe a setup with a cloud chamber, used in the six-meter synchrocyclotron of the Institute of Nuclear Problems, Academy of Sciences,USSR, for the investigation of the interaction between negative pions and atomic nuclei.

Card 1/1

DZHELEPOV, V. P.

USSR/Nuclear Physics - Installations and Instruments. Methods of Measurement and Research. C-2

Abs Jour : Ref Zhur - Fizika, No 4, 1957, 8513

Author : Dzhelepov, V.P., Dmitriyevskiy, V.P., Katyshev, V.S., Kozodayev, M.S., Meshcheryakov, M.G., Sarakanov, K.I., Chestnoy, A.V.

Title : Particle Guns for High Energy Particles from a Six-Meter Synchrocyclotron and Their Use.

Orig Pub : Atom. energiya, 1956, No 4, 13-21.

Abstract : The authors consider the problem of increasing the efficiency of the six-meter phasotron of the Institute of Nuclear Problems of the Academy of Sciences, USSR. A procedure is described for obtaining and collimating a large number of particle beams, on which several experimental setups can operate simultaneously. Brief descriptions of these beams are given.

Card 1/1

Dzhelepov, V. P.

6934

EXPERIMENTAL INVESTIGATION OF NEUTRON-NUCLEON AND NEUTRON-DEUTERON INTERACTION IN THE ENERGY REGION 380-680 MEV. V. P. Dzhelepov, Yu. M. Kazarinov, B. M. Golovin, V. B. Fliagin, and V. I. Satarov (Institute of Nuclear Problems of the Academy of Sciences of the U.S.S.R., Moscow). Nuovo cimento (10) 3, Suppl. No. 1, 61-79(1956). (In English)

Data on the nuclear interaction of particles in antisymmetric states were obtained from experimental scattering data of identical nucleons. Elastic scattering data of (n,p) and (n,d) reactions were investigated. (F.S.)

DZHELEPOV, V.P.

USSR/Nuclear Physics - Elementary Particles. C-3

Abs Jour : Ref Zhur - Fizika, No 4, 1957, 8665

Author : Galovin, B.M., Dzhelepov, V.P.
Inst : Institute of Nuclear Problems, Academy of Sciences USSR
Title : An Investigation of the Elastic Scattering of 590 Mev Neutrons by Neutrons.

Orig Pub : Zh. eksperim. i teor. fiziki., 1956, 31, No 2, 194-201

Abstract : The differential scattering cross section for the elastic scattering of neutrons by neutrons has been determined using a neutron telescope. The effective energy of the neutrons was 590 Mev. A striking anitropy of the (n-n)-scattering has been established: $\sigma_{nn}(30^\circ)/\sigma_{nn}(90^\circ) = 2.3$. It has been found that the differential (n-n)-scattering cross section in the investigated angular region ($30^\circ \leq \vartheta \leq 90^\circ$) is equal to the proton-proton cross section at the same energy within experimental error. This fact, together with the results of our

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USSR/Nuclear Physics - Elementary Particles. C-3

Abs Jour : Ref Zhur - Fizika, No 4, 1957, 8665

earlier work on neutron-neutron scattering at 300 Mev (Referat Zhur Fizika, 1955, 21226) points directly to the charge summetry of nuclear forces at high energies.

Card 2/2

DZHELEPOV, V.P.

AUTHOR: DZELEPOV,V.P., IVANOV,V.G., KOZODAEV,M.G., OSIPENKOV,V.T., PETROV,N.I., RUSAKOV,V.A. PA - 2003

TITLE: Interaction between Negative Pions and Carbon-and Lead Nuclei in the Case of Energies of from 230 up to 250 MeV.

PERIODICAL: Zhurnal Eksperimental'noi i Teoret.Fiziki, 1956, Vol 31, Nr 6, pp 923-931 (U.S.S.R.)

Received: 1 / 1957 Reviewed: 3 / 1957

ABSTRACT: This work was carried out on the synchrocyclotron of the Institute for Nuclear Problems of the Academy of Sciences in the USSR; it investigates the interaction mentioned in the heading by the method of the WILSON chamber which is located in a magnetic field.

The experimental device and the method for the treatment of the photographs: A graphite target served as a source for negative pions; it was arranged in the chamber of the accelerator within the circulating bundle of the 670 MeV protons. The 230-250 MeV pions emitted in a forward direction from the target were directed by means of a large collimator and a deflecting magnet towards a WILSON chamber situated behind a concrete shield. In the chamber a plate of the material to be investigated was mounted under an angle of 90° with respect to the direction of the incident bundle of pions. The traces were photographed by means of a stereo camera. - Experimental results: 760 cases of 6000 photographs were found to represent cases of nuclear interaction between pions and carbon, and 629 others represented cases of interaction between pions and lead. Examples of such interactions are supplied in form of attached photographs. The following facts were

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Interaction between Negative Pions and Carbon-and Lead Nuclei in the Case of Energies of from 230 up to 250 MeV. PA-2003

established in the course of work carried out with the experimental material: A) The total and differential cross sections of elastic scattering within the range of the scattering angles of from 10 to 180°, B) The total and differential cross sections of nonelastic scattering, C) The energy distribution of the non-elastically scattered pions, D) The total cross sections of all nonelastic interaction processes. All cross sections measured for carbon- and lead nuclei referred to energies of 230±30 MeV and 250±30 MeV respectively.

Summary: The measured angular distributions and the total cross sections of the elastic scattering of pions in the case of scattering angles of $\theta > 10°$ as well as the total cross sections of nonelastic interaction are satisfactorily described by the optic model of interaction between pions and composed nuclei. Nonelastic scattering within the range of the scattering angles of from 60 to 180° is chiefly due to simple collisions between impinging pions and single nucleons of the nuclei. The absorption of pions in the nuclear material takes place (also at lower energies) above all as a result of the capture of nuclear nucleons by (p-n)pairs. The total cross sections of the nonelastic interaction processes of pions are equal to geometric cross sections.

ASSOCIATION: Institute for Nuclear Problems of the Academy of Sciences in the USSR
PRESENTED BY:

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CARD 2 / 2

DZHELEPOV, V.P.

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1635
AUTHOR DŽELEPOV,V.P., MOSKALEV,V.I.
TITLE The Total Cross Section of pd-Interaction in the Energy Interval 390-650 MeV.
PERIODICAL Dokl.Akad.Nauk, 110, fasc.4, 539-541 (1956)
Issued: 12 / 1956

The present work discusses the determination of this cross section on the synchrocyclotron of the Institute for Nuclear Problems of the Academy of Science in the USSR by measuring the reduction of the intensity of the collimated proton bundle by samples of ordinary and heavy water at "good" geometrical conditions. Arrangement and method of the experiment were similar as with V.P.DŽELEPOV et al, Dokl.Akad.Nauk, 104, 380 (1955). A scintillation counter registered all protons deflected from the original direction of the bundle up to 3°. Triple and quadruple coincidences as well as retarded quadruple coincidences were measured, and results were shown together in a table.
The scattering cross sections $\sigma_{p(p-d)} = \sigma(D_2O) - \sigma(H_2O)$ remain constant within the energy interval of from 390 to 650 MeV and within the limits of measuring errors. At an energy of 390 MeV, $\sigma_{p(d-p)}$ agrees practically with the value of $\sigma_{p(p-d)} = (31,6\pm2).10^{-27} cm^2$ obtained at a proton energy of 408 MeV. The total cross sections of pd-interaction were computed on the basis

Dokl.Akad.Nauk, 110, fasc.4, 539-541 (1956) CARD 2 / 2 PA - 1635

of the total cross sections of pp-interaction found by the authors and by S.V.MEDVED'. σ_{pd} increases by about 25% if proton energy increases from 390 to 650 MeV, which is apparently due to the increase of the cross sections of meson production on the occasion of elementary nucleon-nucleon collisions. A comparison of these results with the total cross sections of nd-interaction provides an argument in favor of the charge symmetry of nuclear forces at high energies.

Also the difference between the sum of total cross sections for free pp- and np-collisions and the total cross section of pd-interaction is given. At a proton energy of from 580 to 650 MeV this difference is somewhat greater than measuring errors and amounts to about 8% of the deuteron cross section. For the observed reduction of the deuteron cross section the following reasons are given: screening of one nucleon of the deuteron by the other, interference effects, forbidding of some final states of nucleons by the PAULI principle, and the simultaneous interaction of all three particles participating in the collisions. By the methods of the diffraction theory,

$\sigma_d = \sigma_1 + \sigma_2 - (\sigma_1\sigma_2/4\pi)(1/r^2)_d$ is obtained for the total cross section of the deuteron. Here σ_1 and σ_2 denote the cross sections for the free nucleons, and $r_d = 1{,}7 \cdot 10^{-13}$ cm is the radius of the deuteron in the triplet state. The satisfactory agreement between computed and experimental data seems to confirm R.J.GLAUBER'S explanation of the deviation from additivity of the nucleon cross sections of the deuteron.

INSTITUTION: Institute for Nuclear Problems of the Academy of Science in the USSR

DZHELEPOV, V.P., GOLOVIN, B.M., KAZARINOV, Yu.M., SEMENOV, N.N.,

"Elastic Scattering of 580 MeV Neutrons by Protons and Neutrons," paper presented at CERN Symposium, 1956, appearing in Nuclear Instruments, No. 1, pp. 21-30, 1957

DZHELEPOV, V.P., DMITRYEVSKIY, V.P., KATYSHEV, V.S., KOZODAYV, M.S., MESHCHERYAKOV, M.G., PONTEKORVO, B. CHESTNOY, A.Y.

"High Energy Particle Beams from the six Metre Synchrocyclotron and their Utilization," paper presented at CERN Symposium, 1956, appearing in Nuclear Instruments, No. 1, pp. 21-30, 1957

DZHELEPOV

JEFREMOV, D.V.; MESCERJAKOV, M.G.; MINC, A.L.; DZELEPOV, V.P.; IVANOV, P.P.; KAMYSEV, V.S.; KOMAR, J.G.; MALYSEV, I.F.; MONOSZON, N.A.; NEVJAZSKIJ, I.Ch.; POLJAKOV, B.I.; CESTNOJ, A.V.; BENDA, Frantisek [translator]

The six meter synchrocyclotron of the Institute for Research on Nuclear Problems affiliated to the Academy of Sciences of Soviet Union. Jaderna energie 3 no.1:1-4 Ja '57.

1. Ustav jaderne fysiky (for Benda).

Dzhelepov, V.P.

89-11-6/9

AUTHORS: Dzhelepov, V.P., Pontekorvo, B.M.

TITLE: Studies in High -Energy Particle Physics Made in the Synchro-Cyclotron at the Laboratory for Nuclear Problems of the United Nuclear Research Institute. (Issledovaniya po fizike chastits vysokikh energiy na sinkhrotsiklotrone Laboratorii yadernykh problem Ob"yedinennogo instituta yadernykh issledovaniy)

PERIODICAL: Atomnaya Energiya, 1957, Vol. 3, Nr 11, pp. 413-443 (USSR)

ABSTRACT: Achievements attained by soviet physicists in the field of the physics of high-energy particles are described in detail. This summarizing report supplies information on the following items:
1) Initiation of the synchro-cyclotron and the ray characteristics
2) Reconstruction of the accelerator and present efficiency.

Particles to be accelerated and their energies:

	deuterons	α-particles	protons
Current on the inner target in	1	0,025	0,2-0,3
Beam density 10 m distant from the channel in cm^{-2},sec^{-1}	--	---	$1 \cdot 10^6$ (E_p=460 MeV)
Neutron density in the maximum of the angular distribution, 2m distant from the inner [illegible] in cm^{-2}, sec^{-1}	8.10^7	2.10^5	5.10^6

Studies in High-Energy Particle Physics Made in the Synchro-Cyclotron 89-11-6/9
at the Laboratory for Nuclear Problems of the United Nuclear Research Institute.

Energy of the neutron in the maximum of the energy distribution in MeV	12o	12o	38o
Half width of the neutron angular distribution in rad	o,17	o,35	o,55
Process from which the neutrons develop	stripping	fission of α-particles	exchange-interaction

3) Experiments with 28o MeV deuterons and 56o α-particles.
a) Mass determination of the mesons with develop under the action of 5oo MeV particles
b) Nuclear fission by π-mesons
c) Splitting of 56o MeV α-particles
d) Stripping process of the deuterons
e) ρ-radiation from the inner target of the synchrotron
f) nuclear fission by neutrons
g) artificial α-activities
4) Elastic scattering of nucleons on nucleons.
a) p-p-scattering and polarization of protons occurring on this occasion

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Studies in High-Energy Particle Physics Made in the Synchro- 89-11-6/9
Cyclotron at the Laboratory for Nuclear Problems of the United Nuclear Research Institute.

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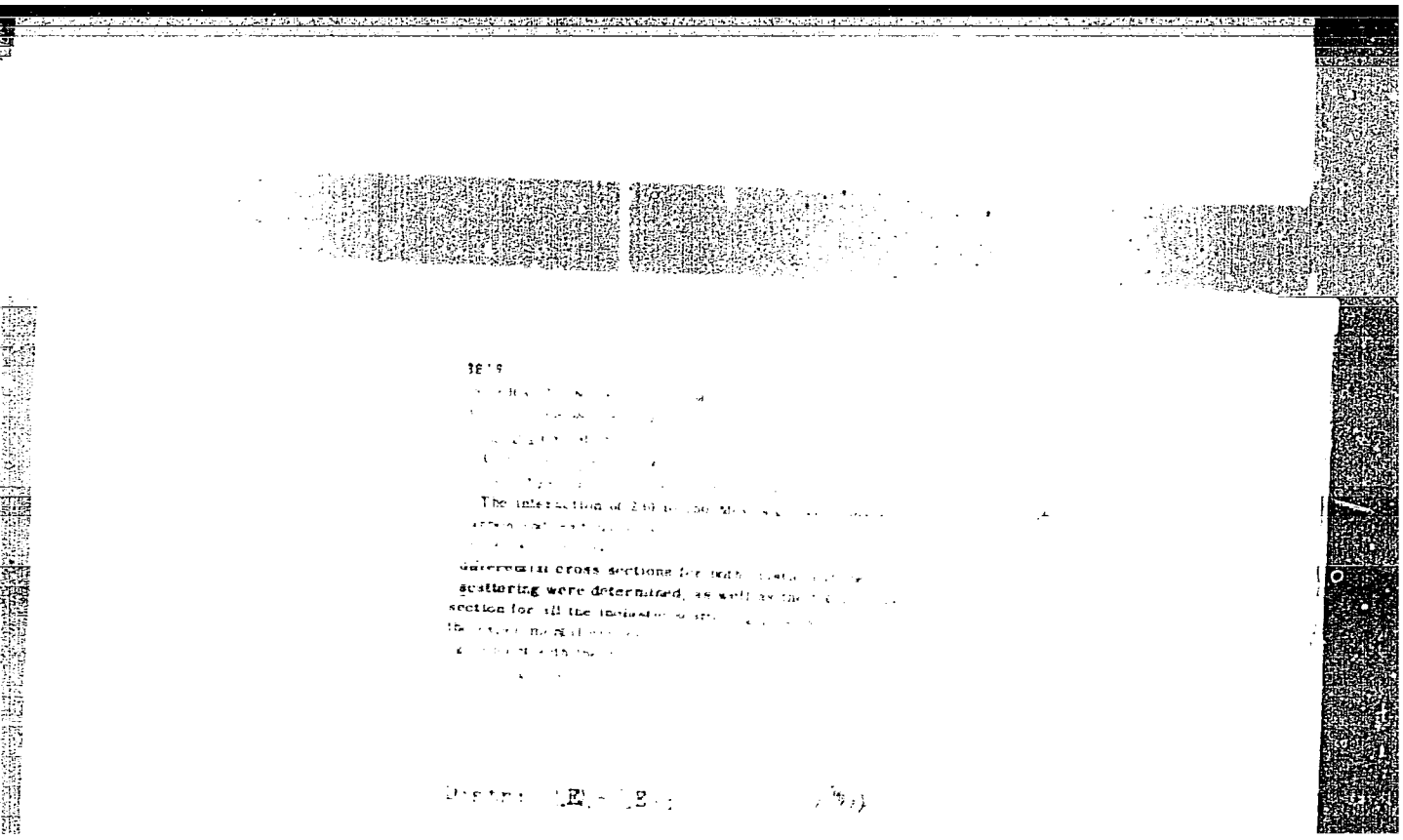

differential cross sections
scattering were determined,
section for all the

DZHELEPOV, V.P.

HIGH-ENERGY NUCLEAR PHYSICS: PARTICLE BOMBARDMENT OF NUCLEII

"Research in Physics of High-Energy Particles Made with the Synchrocyclotron of the Laboratory for Nuclear Problems of the Joint Institute for Nuclear Research," by V. P. Dzhelepov and B. M. Pontecorvo. Atomnaya Energiya, No 11, November 1957, pp 413-443.

Description of the fundamental scientific research is performed by Soviet physicists with high-energy particles at the synchrocyclotron of the Joint Institute for Nuclear Research, which is capable at the present time of accelerating particles up to 680 Mev. After giving a description of the synchrocyclotron in its present form, the authors describe certain experimental investigations performed with 280-Mev deuterons and 560-Mev particles: determination of the mass of mesons produced under the action of 500-Mev particles; fission of nuclei under the action of pions; splitting of 560-Mev ·particles into individual nucleons; stripping of deuterons; elastic scattering of nucleons by nucleons; interaction between mesons and nucleons, and similar projects.

Card: 1/2

AUTHOR DZHELEPOV, V.P., OGANESYAN, K.O., FLYAGIN, V.B. 56-4-6/52

TITLE The Production of Neutral Pions By Neutrons On a Deuteron and On Complicated Nuclei.
(Obrazovaniye neytral'nykh π-mesonov neytronami na deytone i slozhnykh yadrakh -Russian)

PERIODICAL Zhurnal Eksperim.iTeoret.Fiziki,1957,Vol 32,Nr 4,pp 678-681(U.S.S.R.)

ABSTRACT The paper under review contains the results of measurements of the total cross sections of production of neutral pions at collisions of neutrons with neutrons and deuterons,as well as data on the yields of γ-quanta at the decay of neutral pions (which had been produced by neutrons on nuclei of different elements).The most interesting of these experiments is the investigation of the production of neutral pions at collisions of neutrons with neutrons,because this reaction had not been discovered so far.

Production of neutral pions on deuterium: In order to investigate this process of production,difference experiments were carried out at targets of D_2O and H_2O.Cylinders of safety glass were used as containers for the heavy and for the normal water.The γ-quanta produced at the decay of the neutral pions were recorded by a telescope consisting of scinitillation counters and of a Cerenkov detector.The measurements conducted by the authors of the paper under review led to the following result: $(\sigma_{nd}^{\pi^0} - \sigma_{np}^{\pi^0})/\sigma_{np}^{\pi^0} = 0.30 \pm 0.04$. With the aid of this ratio it is possible to find from the known cross section $\sigma_{np}^{\pi^0}$ the difference of the cross section of production of π^0-mesons at (nd)- and (np)-collisions:

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The Production of Neutral Pions By Neutrons On a Deuteron and On Complicated Nuclei. 56-4-6/52

$\sigma_n^{\pi o}(d\text{-}p) = (1.7 \pm 0.5) \cdot 10^{-27} cm^2$. Furthermore it is possible to determine the cross section of production of neutral pions at(nd)-collisions; $\sigma_{nd}^{\pi o} = (7.4 \pm 2.0) \cdot 10^{-27} cm^2$. If the coupling of the nucleons in the deuteron is neglected, then the difference $\sigma_n^{\pi o}(d\text{-}p)$ represents the cross section of production of neutral pions at collisions of neutrons with neutrons $\sigma_{nn}^{\pi o}$; this cross section is exactly what the investigations described in the paper under review attempted to find.

Production of neutral pions by neutrons on complicated nuclei: In analogy to the investigations described above the authors of the paper under review determined the relative output of γ-quanta at the decay of neutral pions which had been produced at collisions of neutrons of 590 MeV with nuclei of Be,C,Al,Cu,Sn,Pb, and U. The thus obtained experimental dependence of the output of γ-quanta on the atomic weight is in agreement for the elements from C to Cu with the formula $\left[(A-Z)\sigma_{nn}^{\pi o} + Z\sigma_{np}^{\pi o}\right] A^{-1/3} A^{2/3}$.

The neutral pions are produced mainly on the surface nucleons of the nucleus. (1 reproduction, 1 char;).

ASSOCIATION Unified Institute of Nuclear Research.
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24(5)

AUTHORS: Flyagin, V. B., Dzhelepov, V. P., Kiselev, V. S., Oganesyan, K. O.

SOV/56-35-4-4/52

TITLE: Investigation of the Reaction $n+p \rightarrow \pi^0+d$ at Effective Neutron Energies of 600 MeV and the Hypothesis of Charge Independence (Izucheniye reaktsii $n+p \rightarrow \pi^0+d$ pri effektivnoy energii neytronov 600 MeV i gipoteza zaryadovoy nezavisimosti)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 4, pp 854-867 (USSR)

ABSTRACT: The hypothesis of the charge independence of nuclear forces is the fundamental basis of the present phenomenological theory; therefore, experiments carried out for the purpose of checking the validity of this hypothesis are of great importance. The authors investigated the reactions $n+p \rightarrow \pi^0+d$ and $n+p \rightarrow \pi^0+n+p$ with an apparatus of complicated structure, which is described. The neutrons originated from a synchrocyclotron, the energy amounted to 600 MeV, and the intensity of the beam was $3.10^4 cm^{-2} sec^{-1}$. The experimental order is outlined by figure 1. The γ-quanta produced by the decay of π^0-mesons were recorded

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by means of a telescope of the following structure: 3 scintillation counters (diameter 90, 120 and 125 mm respectively), before them a lead converter (diameter 90 mm, thickness 7 mm), and before it the fourth counter. For the scintillation counters solutions of terphenyl in toluene or in phenyl-cyclohexane in duralumin - or plexiglass containers were used. The target consisted of CH_2 or carbon. Recording of deuterons is carried out by means of a magnetic spectrometer having a maximum magnetic field strength of 18000 Oe and a gap width of 60 mm. The detector operated at 1700-2100 V. The electric plant is shown in figure 2 in form of a block scheme. In the following, control tests, the γ-telescope, the measuring results and their utilization, as well as measurement of the total cross section are dealt with. Finally, the results obtained are discussed. For the angular distribution at 600 MeV the authors obtained $(0.220 \pm 0.022) + \cos^2\theta$ (in the c. m. s.) and a total cross section of

$$(1.5 \pm 0.3) \cdot 10^{-27} \text{cm}^2 ;$$

these values are indicative of the existence of charge independence.

APPROVED FOR RELEASE: 03/13/2001 CIA-RDP86-00513R000411910006-9"

Investigation of the Reaction n+p → π°+d at Effective Neutron Energies of 600 MeV and the Hypothesis of Charge Independence

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They are compared in a table with those published by Cohn (Ref 3) and by Meshcheryakov and Neganov (Ref 5). In conclusion, the authors thank Yu. D. Bayukov, M. S. Kozodayev, A. A. Markov, A. N. Sinayev, A. A. Tyapkin, L. I. Lapidus, B. M. Pontecorvo and M. M. Kuznetsov for their advice and collaboration. There are 8 figures, 3 tables, and 14 references, 7 of which are Soviet.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute for Nuclear Research)

SUBMITTED: April 30, 1958

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21(8)

SOV/56-35-6-38/44

AUTHORS: Budagov, Yu. A., Viktor, S., Dzhelepov, V. P., Yermolov, P. F., Moskalev, V. I.

TITLE: The Electron-Positron Pairs Which Are Formed in the Decay $\pi^0 \longrightarrow e^- + e^+ + \gamma$ (Elektronno-pozitronnyye pary, obrazovannyye pri raspade $\pi^0 \longrightarrow e^- + e^+ + \gamma$)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 6, pp 1575-1577 (USSR)

ABSTRACT: In a diffusion chamber, which was filled with hydrogen (up to 25 atm) and was irradiated with a 150 MeV negative pion beam of the synchrocyclotron of the Ob"yedinennyy institut yadernykh issledovaniy (United Institute for Nuclear Research), 14 cases of a charge exchange scattering of negative pions by hydrogen with following $\pi^0 \longrightarrow e^- + e^+ + \gamma$ decay of the π^0-meson were recorded according to the Dalitz (Dalits) scheme. This chamber had a sensitive range of 380 mm diameter and operated in a 9000 Oe constant magnetic field. These 14 cases were found when looking over 45000 stereoscopic photographs. Two of these

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The Electron-Positron Pairs Which Are Formed in the Decay $\pi^0 \longrightarrow e^- + e^+ + \gamma$

photos are attached. The results obtained by the evaluation of plates with electron-positron pairs are given by a table. The electron energies E^- and the positron energies E^+ could be determined from the curvature radii of the traces with an inaccuracy of not more than 10-15%. The total energies $E = E^- + E^+$ of all pairs are within the interval of 17-270 MeV, which corresponds to the energy spectrum of the γ-quanta formed by the decay of neutral pions (produced by re-charging). The table also contains the correlation angles α (in the laboratory system) between the electrons and positrons of the pairs and the angles Θ between the direction of motion of the center of mass of the pair and the inciding negative pion. For the general form of angular distribution it holds that $\mathcal{P}(\alpha) \sim$ const $d\alpha/\alpha$ (R. H. Dalitz) (Ref 2). Because of the good correlation between the electrons and positrons produced by the decay $\pi^0 \longrightarrow e^- + e^+ + \gamma$ the angular distribution of pairs must be in very good agreement with that of the γ-quanta originating from the decay $\pi^0 \longrightarrow 2\gamma$. The kinematics of none of the 7 pairs with exactly determined

The Electron-Positron Pairs Which Are Formed in the Decay $\pi^0 \longrightarrow e^- + e^+ + \gamma$

total energy corresponds to the decay $\pi^0 \longrightarrow e^- + e^+$. Besides, not a single decay $\pi^0 \longrightarrow e^- + e^+ + e^- + e^+$ was found. Investigations are still being continued. The author thanks L. I. Krasnoslobodtseva for her help in looking through the photographs. There are 2 figures, 1 table, and 11 references, 2 of which are Soviet.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute for Nuclear Research)

SUBMITTED: August 26, 1958

DZHELEPOV, V. P.

AUTHORS: Dzhelepov, V. P., Pontekorvo, B. M. 53-1-2/8

TITLE: The Investigations Dealing With the Physics of Particles With High Energy at the Synchrocyclotron of the Laboratory for Nuclear Problems of the United Institute for Nuclear Research (Issledovaniya po fizike chastits vysokikh energiy na sinkhrotsiklotrone Laboratorii yadernykh problem Ob"yedinennogo instituta yadernykh issledovaniy)

PERIODICAL: Uspekhi Fizicheskikh Nauk, 1958, Vol. 64, Nr 1, pp. 15-54 (USSR)

ABSTRACT: This work attempts to give an idea of the basic scientific research work on particles of high energy, which was performed by the Soviet scientists at the synchrocyclotron, mentioned in the title, which is the largest one in the world. This detailed report, which is supplied with many figures and diagrams, is arranged as follows: The starting up of the synchrotron and the characteristics of the beam of high-energy particles; the designing of the accelerator and its present state; some experimental investigations with 28o MeV-deuterons and with α-particles with the energy of

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560 MeV; the determination of the mass of the mesons, which form by the action of 500 MeV-particles; the fission of nuclei under the impact of pions; the spalation of α--particles with the energy of 560 MeV into single nucleons; the stripping of deuterons; the detection of the hard γ--radiation, which originates from the target of the synchrocyclotron; the fission of nuclei in case of the action of neutrons; the artificial α-radioactivity; the elastic scattering of nucleons by nucleons; the elastic scattering of protons by protons and the polarization in case of the elastic (p-p)-scattering; the elastic scattering of neutrons by neutrons and protons; the exchange scattering of neutrons by deuterons at the energy of 380 MeV; the elastic scattering of protons by deuterons and the direct knocking out of deuterons by protons from light nuclei; the total cross sections of the nuclear interaction of nucleons with nucleons and deuterons; the interactions of mesons and nucleons; the scattering of pions on nucleons and combined nuclei; the production of mesons by nucleons; the energy-dependence of the cross sections of the

The Investigations Dealing With the Physics of Particles With High Energy at the Synchrocyclotron of the Laboratory for Nuclear Problems of the United Institute for Nuclear Research 53-1-2/8

processes of meson-production and the angular distributions of the mesons; the energy spectra of the particles, which are emitted in case of inelastic collisions of two nucleons; the production of pions by mesons; myons; strange particles; the interaction of energy-rich particles with composed nuclei; the methods of investigation and the apparatus used; The examination discussed here enlarged the knowledge on this field and raised some new important problems; they also showed effective ways for the solution of these problems. The investigations also were a good training for the education of a numerous collective group of Soviet physicists, engineers, and designers of various branches. One of the purposes of the institute mentioned in the title, is the training of staff groups of physicists from the 12 countries, which are partners in the institute. There are 31 figures, 2 tables, and 121 references, all of which are Slavic.

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Dzhelepov V.P.

AUTHORS: Lebedev, P., Smorodinskiy, Ya., Tyapkin, A. S/053/60/070/02/009/016. B006/B007

TITLE: The Physics of Elementary Particles

PERIODICAL: Uspekhi fizicheskikh nauk, 1960, Vol 70, Nr 2, pp 361-374 (USSR)

ABSTRACT: The authors give a report on the International Conference on High Energy Physics held at Kiyev in July 1959. B. L. Ginzburg and I. Ye. Tamm. Two of the seven holders of the Nobel Prize represented were Russians: I. Ye. Tamm and P. A. Cherenkov. Apart from the surveying lectures seminars were held, in which the following Russian lecturers spoke: I. Ye. Tamm on "Diagram Technique and Field Theory", D. D. Ivanenko on the "Nonlinear Field- and Gravitation Theory", V. P. Dzhelepov on "Nucleon-Nucleon Collisions", and L. V. Groshev on "Bubble Chambers". The plenary sessions began on July 20. In the first session Bernardini (CERN) spoke. His scientific secretaries were A. Baldin and A. Belousov (Moscow). The report on the lecture mentions the data obtained at the Fizicheskiy Institut im. P. N. Lebedeva AN SSSR (Physics Institute imeni P. N. Lebedev AS USSR) on the "Polarizability of Protons in (γp)-Collisions". B. Pontekorvo (Dubna) delivered a lecture, which is discussed here in detail, on "Pion Scattering by Nucleons and Production of Single Pions in Nucleon-Nucleon and Pion-Nucleon Interactions". Next, V. I. Veksler (Dubna) spoke about "Nucleon-Nucleon and Pion-Nucleon Interactions in the 1.5 - 10 Bev Range".

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SOV/120-59-5-6/46

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AUTHORS: Golovin, B. M., Dzhelepov, V. P., Katyshev, Yu. V., Konin, A.D. and Medved', S.V.

TITLE: A Ring Target Apparatus for Studying High-energy Small-angle Neutron Scattering

PERIODICAL: Pribory i tekhnika eksperimenta, 1959, Nr 5, pp 33-35 (USSR)

ABSTRACT: The authors have measured n,p cross-sections in the small-angle range (35° - 5° centre of mass system) at ~600 MeV (Ref 1). The method used consists in the following. To begin with a high-energy neutron beam is produced with the aid of an annular brass collimator, as shown on the left-hand side of Fig 1. The beam is then incident on a toroidal circular target whose central axis coincides with the longitudinal axis of the beam. The neutron detector is in the form of a neutron telescope and can be moved along the symmetry axis of the apparatus. The use of a ring target means that it is possible to use a larger amount of scattering material than in the usual targets. The neutrons are produced by 680 MeV protons at an internal target of the synchrocyclotron of the Laboratory for Nuclear Problems of the Joint Institute for

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SOV/120-59-5-6/46

A Ring Target Apparatus for Studying High-energy Small-angle Neutron Scattering

Nuclear Studies. The neutrons scattered by the ring target are recorded by a neutron telescope consisting of five scintillation counters and a converter. Charge exchange protons formed in the converter are recorded by the counters 1, 2, 3 and 4 (Fig 1) placed after the converter and connected in coincidence. In order to exclude charged particles which are not due to charge exchange in the converter, an additional counter 5 is placed in front of the converter and is in coincidence with counters 2, 3 and 4 (CC-2). This scheme is in anti-coincidence with CC-1. The converter is in the form of an aluminium cylinder 4 cm in diameter and 6 cm high. The angular resolution in the lab system is $\pm$ 2° at 15° and $\pm$ 0.25° at 2°. I. G. Dragunov and V.S.Turchenev are thanked for their assistance in building the apparatus. There are 1 figure, 1 table and 3 Soviet references.

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ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute for Nuclear Studies)

SUBMITTED: September 2, 1958

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DZHELEPOV V. P.

21(0)

SOV/89-6-4-16/27

AUTHOR: Parkhit'ko, V.

TITLE: The Fifth Session of the Scientific Council of the Joint Institute of Nuclear Research (Pyataya sessiya Uchenogo soveta Ob"yedinennogo instituta yadernykh issledovaniy)

PERIODICAL: Atomnaya energiya, 1959, Vol 6, Nr 4, p 479 (USSR)

ABSTRACT: The fifth session of the Scientific Council of the Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research) was held from January 14 to 17, 1959. Lectures were held on the following important papers, which were also discussed: Professor V. P. Dzhelepov spoke about the results obtained by the work carried out by the Laboratoriya yadernykh problem (Laboratory of Nuclear Research). Investigations were carried out of: the elastic and inelastic scattering of nucleons on polarized and non-polarized particles, scattering of π-mesons on nucleons, processes of weak interaction in the presence of μ-mesons, and the properties of μ-mesons. The Director of the Laboratoriya teoreticheskoy fiziki (Laboratory for Theoretical Physics) Academician N. N. Bogolyubov, reported that the following subjects were investigated: general scattering theory, field theory, theory

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The Fifth Session of the Scientific Council of the Joint Institute of Nuclear Research

of elementary particles, nucleon structure, dispersion relations, use of the theory of superconductivity in investigations of nuclear matter. Academician V. I. Veksler reported on the work carried out by the Laboratory for High Particle Energies. A considerable amount of work was carried out for the purpose of fixing the normal operational conditions for the 10 Bev synchrophasotron in order to be able, above all, to work day and night with this device. Moreover, a number of new physical devices was developed. The Scientific Council praised the work performed by this laboratory. The results obtained by the most important work carried out by these 3 laboratories were outlined at the 2. Geneva Atomic Conference. I. M. Frank, Corresponding Member, AS USSR and Holder of the Nobel Prize, spoke about the progress made in building the impulse reactor at the Laboratoriya neytronnoy fiziki (Neutron-Physics Laboratory). This reactor differs essentially from a normal reactor and is especially well suited for work to be carried out in the field of neutron physics.

 G. N. Flerov, Corresponding Member, AS USSR, gave a report

The Fifth Session of the Scientific Council of the Joint Institute of Nuclear Research

about nuclear reactions with highly ionized particles. Work was carried out jointly by the USSR and the participating countries in the Laboratory of Nuclear Physics. The Scientific Council approved and confirmed the scientific building plans for 1959. The management of the Institute submitted a plan for the improvement of collaboration among the participants. The Scientific Council expressed its gratitude especially to the following persons: D. I. Blokhintsev, Director of the Institute, Corresponding Member, AS USSR; Vaclav Votruba, Deputy Director and Corresponding Member of the Czechoslovakian Academy of Sciences, and Professor Marian Danycz (Poland), Deputy Director.

21(9)

SOV/89-6-6-7/27

AUTHORS: Vasilevskaya, D. P., Glazov, A. A., Danilov, V. I., Denisov, Yu. N., Dzhelepov, V. P., Dmitriyevskiy, V. P., Zamolodchikov, B. I., Zaplatin, N. L., Kol'ga, V. V., Kropin, A. A., Lis[illegible]nburg, Rybalko, V. S., Savenkov, A. L., Sarkisyan, L. A.

TITLE: Putting Into Operation a Cyclotron With a Spatially Varying Tension of the Magnetic Field (Zapusk tsiklotrona s prostranstvennoy variatsiyey napryazhennosti magnitnogo polya)

PERIODICAL: Atomnaya energiya, 1959, Vol 6, Nr 6, pp 657 - 658 (USSR)

ABSTRACT: In the present "Letter to the Editor" the authors report on some measurements and theoretical considerations concerning some parameters of the new cyclotron. In the Laboratoriya yadernykh problem Ob"yedinennogo instituta yadernykh issledovaniy (Laboratory for Nuclear Problems of the Joint Institute for Nuclear Research) in the town of Dubna the new cyclic accelerator was started in January 1959; this new type shows both an azimuthally and a radially periodically varying magnetic field. The diameter of the magnet of the accelerator is 1200 mm. The lines of constant field tension have the shape of spirals of Archimedes, $r = 16.2\,\varphi$, periodicity of the field structure:

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N = 6. The mean value of the field tension increases radially according to the relativistic mass increase of the accelerated ions. Since the acceleration originates from the center of the magnet the fundamental frequencies of the free oscillations change accordingly $Q_z = 0$, $Q_r = 1$ (at r=0) to $Q_z = 0.2$, $Q_r = 1.01$ (at r = 52 cm). It was shown theoretically that the radial increase of the mean magnetic field tension which is necessary for the elimination of the nonlinear resonance effect occurring in the center of the accelerator may decrease with increasing N, according to $N/2^N(N-1)!$ and with an increase of the radial spacing in the case of a fixed N as $(\lambda_1/\lambda_2)^{N-2}$. These investigation results were taken into account in selecting the six-spiral structure of the magnetic field in the center of which no nonlinear resonance occurs. All measurements of the field tensions were carried out by means of a nuclear magnetometer (error ± 1.5 Oe). A resonance quarter-wave system with one D-shaped electrode was used for the ion acceleration. In the cyclotron deuterons

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were accelerated up to 12 Mev and α-particles up to 24 Mev at a minimum amplitude of the acceleration tension on the duant of 8 kv. The two methods which were used for measuring the energy in the case of a maximum orbital radius are briefly described. A picture shows the accelerating chamber of the cyclotron (Fig 2), another one an autograph of a neutron beam in the case of different radii. The investigation results prove the possibility of producing a relativistic cyclotron with a proton energy which equals that of a modern phasotron. There are 2 figures and 2 references, 1 of which is Soviet.

SUBMITTED: April 9, 1959

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21(10)

AUTHORS: Golovin, B. M., Dzhelepov, V. P., Nadezhdin, V. S., Satarov, V. I.

SOV/56-36-2-13/63

TITLE: On the Possible Sets of Experiments for the Simultaneous Analysis of Data Concerning Nucleon-Nucleon Scattering and Polarization in p-n Collisions at Energies of 635 Mev (O vozmozhnykh naborakh opytov dlya sovmestnogo analiza dannykh po nuklon-nuklonnomu rasseyaniyu i polyarizatsiya v p-n-soudareniyakh pri energii 635 MeV)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 2, pp 433-443 (USSR)

ABSTRACT: The results obtained by all investigations of nucleon-nucleon scattering can be written down in form of various combinations of the 5 complex coefficients of the scattering amplitude. For the purpose of determining these 5 coefficients it is generally necessary to carry out 9 independent experiments. In dependence on various parameters (as e.g. nucleon energy) this number may increase or decrease. These conditions are discussed in the introduction. The suggestion is made as far as possible to reduce the number of experiments required to reconstruct the scattering amplitude by means of an analysis of the data

On the Possible Sets of Experiments for the Simultaneous Analysis of Data Concerning Nucleon-Nucleon Scattering and Polarization in p-n Collisions at Energies of 635 Mev

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concerning n-p (p-n) and p-p scattering carried out simultaneously. Existing possibilities are discussed in detail, and practical suggestions are given in 2 appendices to this paper. Also the possibility of using data obtained from p-d scattering is investigated. Furthermore, the results obtained by experimental investigations are described; by means of a device described schematically by figure 1 the polarization in p-n collisions was investigated. The research scientists worked with a polarized proton beam of the synchrocyclotron of the OIYaI (United Institute for Nuclear Research), which had an energy of (635 ± 15)Mev. At the target the beam had an intensity of $4\cdot10^5\,sec^{-1}$ and a degree of polarization of $(58\pm3)\%$. The targets consisted of thin-walled plexiglass containers filled with heavy or ordinary water. The n-p scattering for $45^\circ \leq \vartheta \leq 145.7^\circ$ was investigated by recording the protons and neutrons by means of two telescopes connected in coincidence; for proton recording a telescope consisting of three counters with photomultiplier FEU-33 and plastic oscillators, and for recording neutrons a high-efficiency multiple-layer counter

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with liquid-scintillator was used (Ref 6). The results obtained by investigating the angular dependence of polarization in p-n scattering are shown by a table and by figure 2. The table contains the measured $(\epsilon + \Delta\epsilon)$- and $(P+\Delta P)$-values in % for 9 ϑ-values (in the center of mass system). The energy- and angular dependence of polarization for states (of the n-p system) with different isotopic spin is investigated, and these functions are found to depend also on the isotopic spin (T=0, T=1). $(PQ)_{T=1}$ increases with increasing energy, but $(PQ)_{T=0}$ decreases considerably (Figs 3 and 4). In appendix I systems of equations are given for certain forms of scattering amplitudes A_{pp} and A_{np}, with the aid of which suggestions are made in appendix II for experimental sets. The (explicit) equations concern the following basic experiments: 1) Elastic cross section. 2) Polarization in angular scattering. 3) Normal component of polarization relation. 4) Triple scattering in parallel planes (scattered particle). 5) Triple scattering in parallel planes (recoil particle). Polarization correlation in the case of scattering in two planes which are vertical to each

other. 7) Rotation of the polarization vector (scattered particle). 8) Rotation of the polarization vector (recoil particle). 9) The influence exercised by the longitudinal component of incident beam of polarization upon transversal scattering (scattered particle). 10) The same for the recoil particle. In appendix XII several experimental sets are suggested and the formulae for analysis are given.
The authors in conclusion thank L. I. Lapidus, R. M. Ryndin, and Ya. A. Smorodinskiy for discussions. There are 4 figures, 1 table, and 20 references, 10 of which are Soviet.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute for Nuclear Research)

SUBMITTED: September 3, 1958

21(7) SOV/56-36-3-12/71

AUTHORS: Golovin, B. M., Dzhelepov, V. P., Katyshev, Yu. V., Konin, A. D., Medved', S. V.

TITLE: The Scattering of Neutrons by Protons in the Region of Small Angles at Neutron Energies of 590 Mev (Rasseyaniye neytronov protonami v oblasti malykh uglov pri energii neytronov 590 MeV)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 3, pp 735-738 (USSR)

ABSTRACT: The authors investigated the differential cross section of n-p-scattering at an average neutron energy of 590 Mev in the angular range of 5 - 35°; for this purpose a special device with an anular scatterer was developed, which has already been described in one of the authors' earlier papers and is described in this paper (Fig 1). Results:

Scattering angle c.m.s.	Relative amount of n-p-scattering cross section	n-p-scattering cross section in 10^{-27} cm^2/steradian
5	2.7±0.4	10 ± 1.5
8	2.2±0.3	8.2±1.4
11.5	1.7±0.2	6.4±0.9

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The Scattering of Neutrons by Protons in the Region of Small Angles at Neutron Energies of 590 Mev

23	1.2 ± 0.1	4.3 ± 0.5
35	1	3.7 ± 0.2

Determination of coefficients in the amplitude equation of elastic nucleon-nucleon scattering $M = \alpha + \beta(\vec{\sigma}_1 + \vec{\sigma}_2)\vec{n} + \gamma(\vec{\sigma}_1\vec{n})(\vec{\sigma}_2\vec{n}) + \delta(\vec{\sigma}_1\vec{l})(\vec{\sigma}_2\vec{l}) + (\vec{\sigma}_1\vec{m})(\vec{\sigma}_2\vec{m})$ is possible by means of experimental investigations. It holds that

$\sigma(\vartheta = 0^\circ) = |\alpha|^2 + |\beta|^2 + |\delta|^2 + |\varepsilon|^2$ or

$\mathrm{Im}\alpha(\vartheta = 0^\circ) = k\sigma_t(4\pi$, where k denotes the wave number of the incident nucleon. It holds that $\sigma(\vartheta = 0^\circ) - [\mathrm{Im}\alpha(\vartheta = 0^\circ)]^2 = |\mathrm{Re}\alpha|^2 + |\beta|^2 + |\delta|^2 + |\varepsilon|^2$ and by using the experimental results obtained by the authors it is found that $\sigma_{min}(\vartheta = 0^\circ) = [\mathrm{Im}\alpha_{np}(\vartheta = 0^\circ)]^2 = 5.8.10^{-27}\,cm^2$/steradian. Figure 2 shows the energy dependence of $\mathrm{Im}\alpha(\vartheta = 0^\circ)$ for nucleon-nucleon interaction in the states with isotopic spin T = 0 and T = 1 with an accuracy of $\sim 10\%$. Apart from a

The Scattering of Neutrons by Protons in the Region of Small Angles at Neutron Energies of 590 Mev

strong increase of cross sections with a decreasing scattering angle, there is a predominance of forward scattering cross sections over backward scattering cross sections. A comparison of the results obtained by means of the optical theorem shows that it is doubtful whether nucleon-nucleon scattering at $\sim$ 600 Mev can be described on the basis of the opaque nucleon model. There are 2 figures, 2 tables, and 11 references, 7 of which are Soviet.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute for Nuclear Research)

SUBMITTED: September 3, 1958

21(8)

SOV/56-36-4-17/70

AUTHORS: Budagov, Yu. A., Viktor, S., Dzhelepov, V. P., Yermolov, P. F., Moskalev, V. I.

TITLE: On the Observation of a $\pi^0 \rightarrow e^- + e^+ + e^- + e^+$-Decay (O nablyudenii raspada $\pi^0 \rightarrow e^- + e^+ + e^- + e^+$)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 4, pp 1080-1084 (USSR)

ABSTRACT: In the present paper the authors give a very detailed report on the observation of a charge exchange scattering $\pi^- + p \rightarrow \pi^0 + n$ followed by the decay of the π^0-meson into 2 electron pairs. Traces indicating such reactions were found on a stereoscopic photograph, which had been taken in a hydrogen diffusion chamber (hydrogen pressure 25 atm) in the course of $(\pi^- p)$-scattering investigations. The chamber had an outer diameter of 380 mm and a sensitive volume of 6-7 cm at a temperature gradient of 7°C/cm. The chamber was located in a constant magnetic field of 9000 G, the inhomogeneity of which amounted to not more than $\pm 3.5\%$. The photographs were taken by means of a stereoscopic photographic camera with two GOI Gelios-37 object lenses (f = 62 mm); the 35 mm film Pankhrom-Kh had a sensitivity

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of 1000 GOST-units. The pictures were taken through the external glass wall of 25 mm thickness; the object lenses had a resolving power of 50 lines/mm in the visual field center. The π^--meson beam had a mean energy of 160 Mev. Irradiation was carried out on the synchrocyclotron of the United Institute for Nuclear Research. Among 90,000 stereophotographs 1400 cases of elastic $(\pi^- p)$-scattering were found, and 26 cases of charge exchange scattering followed by $\pi^0 \rightarrow e + e + \gamma$-decay were discovered. (Ref 6). Among 25,000 π^0-decays of the usual type $\pi^0 \rightarrow 2\gamma$, one case of a $\pi^0 \rightarrow e^- + e^+ + e^- + e^+$-decay was found. By means of momentum- and angular measurements an estimate of the π^0-mass was given as amounting to (141 ± 8)Mev, which may be in agreement, within the limits of measuring errors, with that of 135 Mev which is today generally assumed. Angular determination in the rest system of the π^0-particle gave the following results for double pair production: Angle between e^- and e^+: $(7 \pm 2)^\circ$ at momenta of 56.1 and 11.9 Mev/c, and $(12 \pm 4)^\circ$ at 9.0 and 58.7 Mev/c. The angle between the planes in which the pair tracks were located, is given as $< 37^\circ$. Finally, other possibilities of interpreting the results obtained are discussed.

On the Observation of a $\pi^0 \rightarrow e^- + e^+ + e^- + e^+$-Decay

they need, however, not to be considered as very probable. The authors in conclusion thank D. W. Joseph (Ref 3) for placing a preprint at their disposal, D. V. Shirkov for discussions, and L. I. Krasnoslobodtseva, T. S. Sazhneva and Yu. L. Saykina for evaluating the films. There are 2 figures, 3 tables, and 10 references, 3 of which are Soviet.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute of Nuclear Research)

SUBMITTED: December 25, 1958

21 (7)

AUTHORS: Budagov, Yu. A., Viktor, S., Dzhelepov, V. P., Yermolov, P. F., Moskalev, V. I.

SOV/56-37-3-54/62

TITLE: The β-Decay of the Negative π-Meson

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 3(9), pp 878 - 880 (USSR)

ABSTRACT: Hitherto only the β-decay of stopped positive mesons has been investigated (Refs 1-6); in references 5 and 6 the relative probability of two such processes was determined as amounting to $(\pi^+ \to e^+ + \nu)/(\pi^+ \to \mu^+ + \nu) \approx 1 \cdot 10^{-4} \pm$ (20-40%), which agrees with the theoretically calculated value for V-A interaction. Theoretically, the same value would have to be obtained for the analogous ratio of negative meson decays. On the search for $\pi^- \to e^-$-decays, the authors of the present "Letter to the Editor" systematically investigated the material of 130- and 160 Mev π^--meson scatterings on protons. A triple evaluation of 100,000 stereophotographs yielded as a result 29 decays in which the secondary particles deviated by $\theta > 20^\circ$; (the maximum angle of deviation in π - μ-decay at 130 Mev was 10°). Of these,

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26 cases were identified as $\mu^- \rightarrow e^-$ and 3 as $\pi^- \rightarrow e^-$ decays. Figure 1 shows the momentum distribution of the electrons of the two decay forms in the rest system of the respective primary particle. A photograph of a $\pi^- - e^- + \nu$-decay (found in a diffusion chamber at 9,000 G) is shown by figure 2. The results obtained by the three $\pi^- - e^-$-decays found are given in a table:

	Laboratory system			Rest system of the π^--meson	
	π^- momentum (Mev/c)	e^- momentum (Mev/c)	$\theta(^\circ)$	e^- momentum (Mev/c)	θ (in degrees)
1.	228 ± 10	104 ± 8	42.5 ± 0.5	74 ± 7	108 ± 2
2.	207 ± 11	103 ± 3	42 ± 0.5	71 ± 4	102 ± 2
3.	266 ± 6	156 ± 26	26 ± 0.5	68 ± 11	86 ± 1

It is found that the identification of these processes is most probably correct, because the maximum electron momentum in the μ^--rest system amounts to only 52.9 Mev/c, whereas that measured in this case is considerably higher. Therefore, it is not possible that $\mu^- \rightarrow e^-$-decays are concerned. Also other processes of this kind, as e.g. $\pi^- \rightarrow \mu^- \rightarrow e^-$-decay during flight, with a

short μ^--track are improbable. The relative probability of these processes was determined as amounting to $(\pi^- \to e^- + \bar{\nu})/(\pi^- \to \mu^- + \bar{\nu}) = (1.2 \pm 0.7) \cdot 10^{-4}$, a value which actually, within the error limits agrees with the values calculated on the basis of V-A interaction for the corresponding positive decay. The authors finally thank T. S. Sazhneva, L. I. Krasnoslobodtseva, and Yu. L. Saykina for their assistance in evaluating the plates. There are 2 figures, 1 table, and 11 references, 3 of which are Soviet.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: June 13, 1959

DZHELEPOV, Venedikt P.

"Pion Production in n-p and d-i Collisions."

"Correlation Coefficient C_{nn} at 650 Mev"

paper presented at the Intl Conference on High Energy Physics, Rochester, N.Y. and/or Berkly California, 25 Aug - 16 Sep 1960.

Joint Inst. for Nuclear Reserch, Dubna, USSR

DZHELEPOV, V. P., DZHAKOV, N. I., IVANOV, V. G., LEPILOV, V. I., MOSKALEV, V. I., FLYAGIN, V. B., SHATET, T., BUDAGOV, YU. A.,

"The One-Meter Propane Bubble Chamber in Magnetic Field"

paper presented at the Intl Conference on High Energy Physics, Rochester, N. Y. and/or Berkly California, 25 Aug - 16 Sep 1960.

Joint Institute for Nuclear Reserch, Dubna, USSR

APPROVED FOR RELEASE: 03/13/2001 CIA-RDP86-00513R000411910006-9"

DZHELEPOV, V.P., KISELEV, V.S., OGANFSYAN, K.O., FLYAGIN,V.B.,

"Pion Production in Neutron-Proton Collision at 590 Mev"

paper presented at the Intl Conference on High Energy Physics, Rochester, N.Y. and/or Berkly California, 25 Aug - 16 Sep 1960.

Dzhelepov, V P.

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SOV/89-8-3-2/32

AUTHORS: Vasilevskaya, D. P., Glazov, A. A., Danilov, V. I., Denisov, Yu. N., Dzhelepov, V. P., Dmitriyevskiy, V. P., Zamolodchikov, B. I., Zapiatkin, N. L., Kol'ga, V. V., Kropin, A. A., Lyu Nee-chuan', Rybalko, V. S., Savenkov, A. L., Sarkisyan, L. A.

TITLE: A Cyclotron With a Spatially Varying Magnetic Field Intensity

PERIODICAL: Atomnaya energiya, 1960, Vol 8, Nr 3, pp 189-200 (USSR)

ABSTRACT: The paper outlines the theory of charged particle motion in a magnetic field with periodic structure along its azimuth and radius, and describes investigations performed during the years 1955-59 on a cyclotron accelerator with spiral-ridged magnetic fields at Joint Institute for Nuclear Research (Obyedinennyy institut yadernykh issledovaniy). The machine was built following the space stability theory developed at Dubna and Harwell. The authors first discuss the linear theory and investigate the particle oscillations with respect to a closed

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AUTHORS: Budagov, Yu. A., Viktor, S., Dzhelepov, V. P., Yermolov, P. F., Moskalev, V. I.

TITLE: Elastic Scattering of 128- and 162-Mev π^--Mesons by Protons

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 38, No. 3, pp. 734-746

TEXT: The article under review was read at the Sixth Meeting of the Scientific Council of OIYaI held in May, 1959, and at the Conference on the Physics of High-energy Particles which took place in Kiyev in July, 1959. This article contains the results of studies of the elastic scattering of negative 128- and 162-Mev pions by protons in a hydrogen diffusion chamber. The experimental arrangement is schematically represented in Fig. 1. The π^--mesons were produced by bombarding a 40 mm thick beryllium target with the 670-Mev proton beam of the synchrocyclotron of OIYaI. About 90,000 stereophotographs were taken. The diffusion chamber is schematically shown in Fig. 2. The chamber operated at pressures of up to 25 atm and had an inside temperature gradient of 7 deg/cm. The sensitive layer was 6 - 7 cm high. A solenoid magnet of the

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Elastic Scattering of 128- and 162-Mev π^--Mesons by Protons

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type MS-4A was used to generate a constant magnetic field (9,000 gauss). This electromagnet was produced at NII EFA by N. S. Strel'tsov, A. V. Ugamm, N. N. Indyukov, Yu. P. Semenov, V. I. Sergeyeva, and A. G. Studennikova. D. P. Vasilevskaya and Yu. N. Denisov supplied a magnetometer based on the Hall effect. The negative pion beams had an energy of 128±8 and 162±10 Mev, the sum of the μ^--meson and electron admixture amounted to (16±2)%. The pictures were evaluated twice. The efficiency of this stereoscopic evaluation was 97 per cent. 379 cases of scattering at 128 Mev and 1,113 cases at 162 Mev were found. Fig. 3 shows the distribution of the number of elastic scattering events with respect to the height of the sensitive layer. At both energies the distributions reached peaks at about 40 mm. The criteria for the selection of scattering events are compiled. The total elastic π^-p-scattering cross section was calculated from the total track length L of the π^--mesons. L was determined by means of the formula $L = 15.36\ T\delta/\cos\alpha_m$ (T - total number of tracks, 15.36 is the width of the area S (Fig. 4), α_m the mean angle of slope of the tracks with respect to the edge of S, $\delta = 1$). Thus it holds that $\sigma_{exp} = N\beta/Ln_{eff}(1-q)r$ (N - number of scattering events, n_{eff} - effective

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